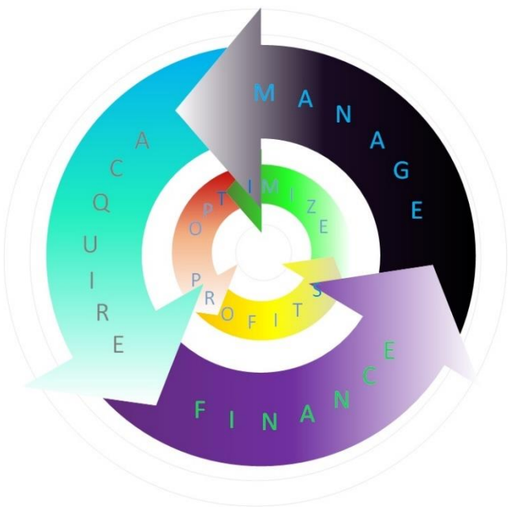
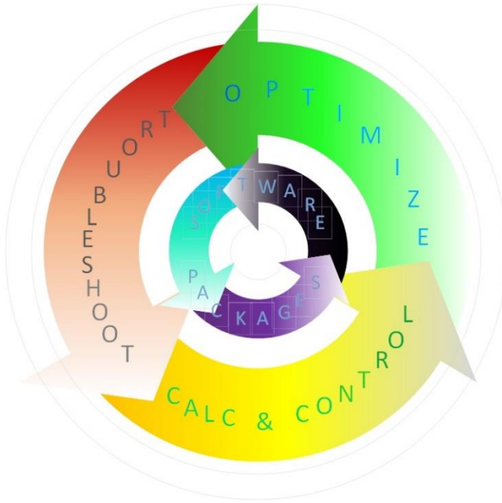
*A full-service engineering, sales, marketing, research firm, going green consulting as well as distributor of SWR products. "Aiding in Saving the World's Resources One City, One State, One Country at a time."*

# GREEN MANTIS, LLC





"Saving World Resources"




SOFTWARE

*We will help with your Conceptualization, Feasibility studies, Planning, Management, Engineering Execution, Sustenance, Controls and Optimization and Improvement of your assets to maximize profits.*

# PROPRIETARY
# UNIQUE, CAPABLE
# INTELLIGENT

## Software Capabilities 1

*The software package is being used as a teaching tool in universities as it performs Academic-level rigorous computations and graphical displays which were previously tediously performed by hand calculations.*

*The Software package performs calculations that are applicable to the following industries: Oil and Gas processing such as Refineries, Chemical plants, Olefins and Aromatics and Specialty chemical processes, Enhanced Oil Recovery, Power and Thermal plants, Oil Movement and Storage facilities as well as the controls and optimization of these facilities.*

**The software package is the ultimate answer to all your vapor-liquid equilibrium, Distillation and EOR needs.**

***Our Software Package gives us the ability to Troubleshoot any continuous manufacturing or chemical related process issues in a way few other companies can. The knowledge gained helps us to expose deeply rooted or cultural issues.***

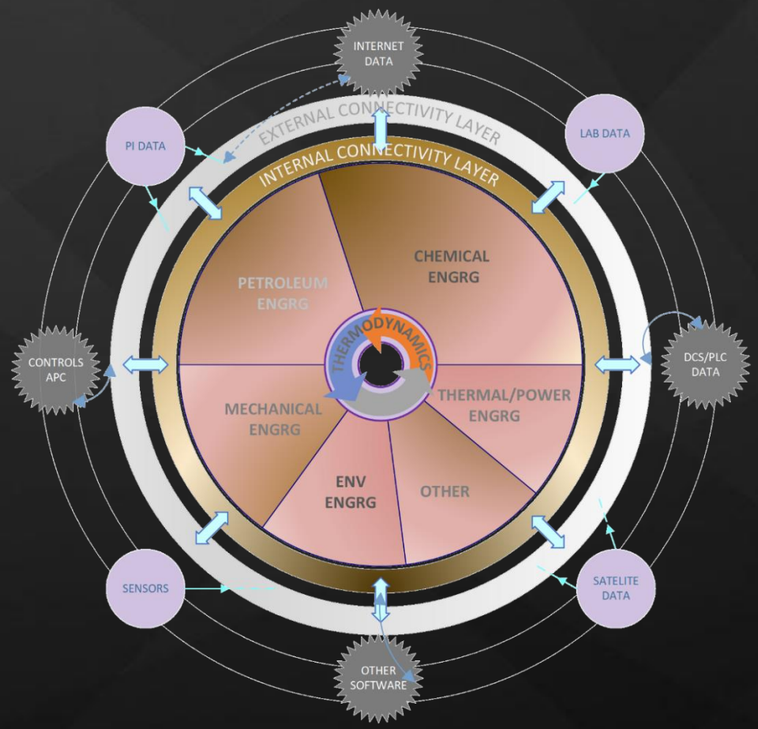
## Software Capabilities 2

*The software package is applicable to the following areas:*

*Design of Chemical processes as applicable to any chemical processing facility including but not limited to Oil and Gas, Power plants, Polymer facilities etc. Simulation of existing plant conditions for comparisons to design basis.*

*Used in several refineries and chemical plants to provide intelligent calculations to stabilize column temperature profiles and millions of dollars per operating unit.*

*Precise thermodynamic properties of water other substances. Plotting of Temp- Spec Vol, Pressure – Spec Vol, Temp-Enthalpy, Pressure-Enthalpy relationships for water other components.*




## Competition

*There are less than a handful of software packages with the capabilities of our software solution. Most or all of these are non-portable, cumbersome to use, highly inflexible and utilize old techniques to find solutions. Most are not built on First Principles or Equations-of-State.*

## Distinction

*The basis of our distinction is our proprietary software solution. A Highly capable, portable First Principles Thermodynamic package using modern Equations-of-State to generate engineering calculations and solve engineering problems that were hitherto difficult to solve.*

***Our Software solution is designed to interphase with all other open system software packages. Thus, it can receive data from and send highly complex and iterative solutions to many other software packages without human intervention.***

## TRAINING

*We provide hands-on training using our proprietary software in the areas of Vapor/Liquid Equilibrium (VLE) and its application in Distillation, EOR, Power Plants & Utilities, Chemical & Mechanical Thermodynamics and many other areas.*

*Our software provides a one-stop simulation shop for your Distillation simulation, process design and controls need.*

*Other areas of engineering training include:*
*Controls and Advanced Controls*
*Distributed Control System (DCS) Fundamentals.*
*Refining, Petrochemicals & Natural Gas Fundamentals.*
*Power Plant Fundamentals.*

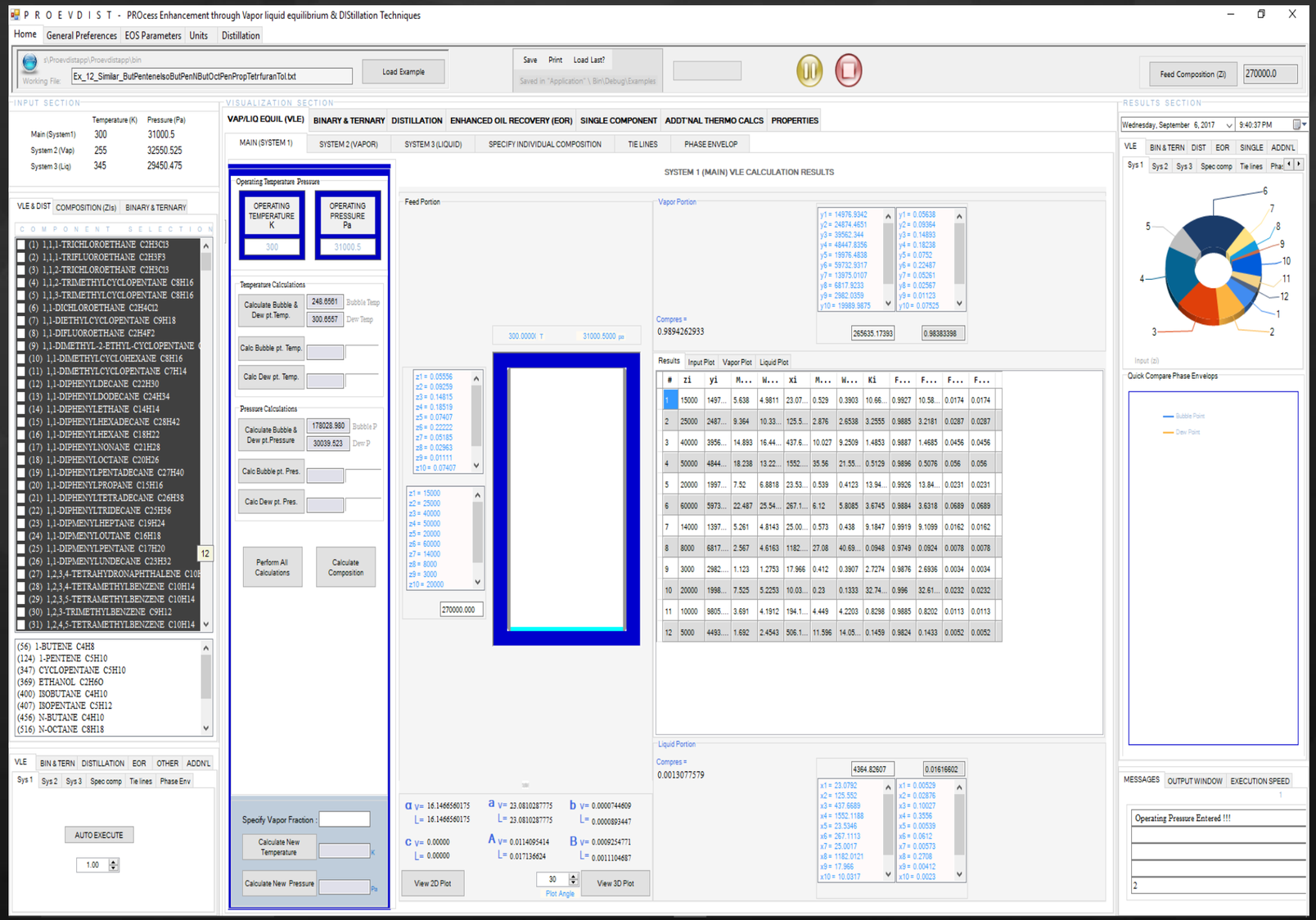
***We will help with your Conceptualization, Feasibility studies, Planning, Management, Engineering Execution, Sustenance, Controls, Troubleshooting and Optimization and Improvement of your assets to maximize profits.***

## INTRODUCTION

- Our proprietary software is a highly capable computer simulation software program that utilizes first principles of Thermodynamics to perform extensive and rigorous vapor-liquid equilibrium calculations.

- The Software package employs many Equations of State such as Peng-Robinson, Peng-Robinson-Gasem, Soave-Redlich-Kwong and many other Cubic Equations of State (CEOS) to perform rigorous calculations but also gives the user the ability to perform calculations using short-cut methods or approximations.

- The software package contains over thirty properties for more than 600 components (elements and compounds). The database contains most of the common substances found in any chemical processing industry.




*The software package contains over thirty properties for more than 600 components (elements and compounds).*

*Peng-Robinson, Peng-Robinson-Gasem, Redlich-Kwong, Soave-Redlich-Kwong, Stryjek-Vera-Peng-Robinson, Patel-Teja, Van Der Waals*

## INTRODUCTION

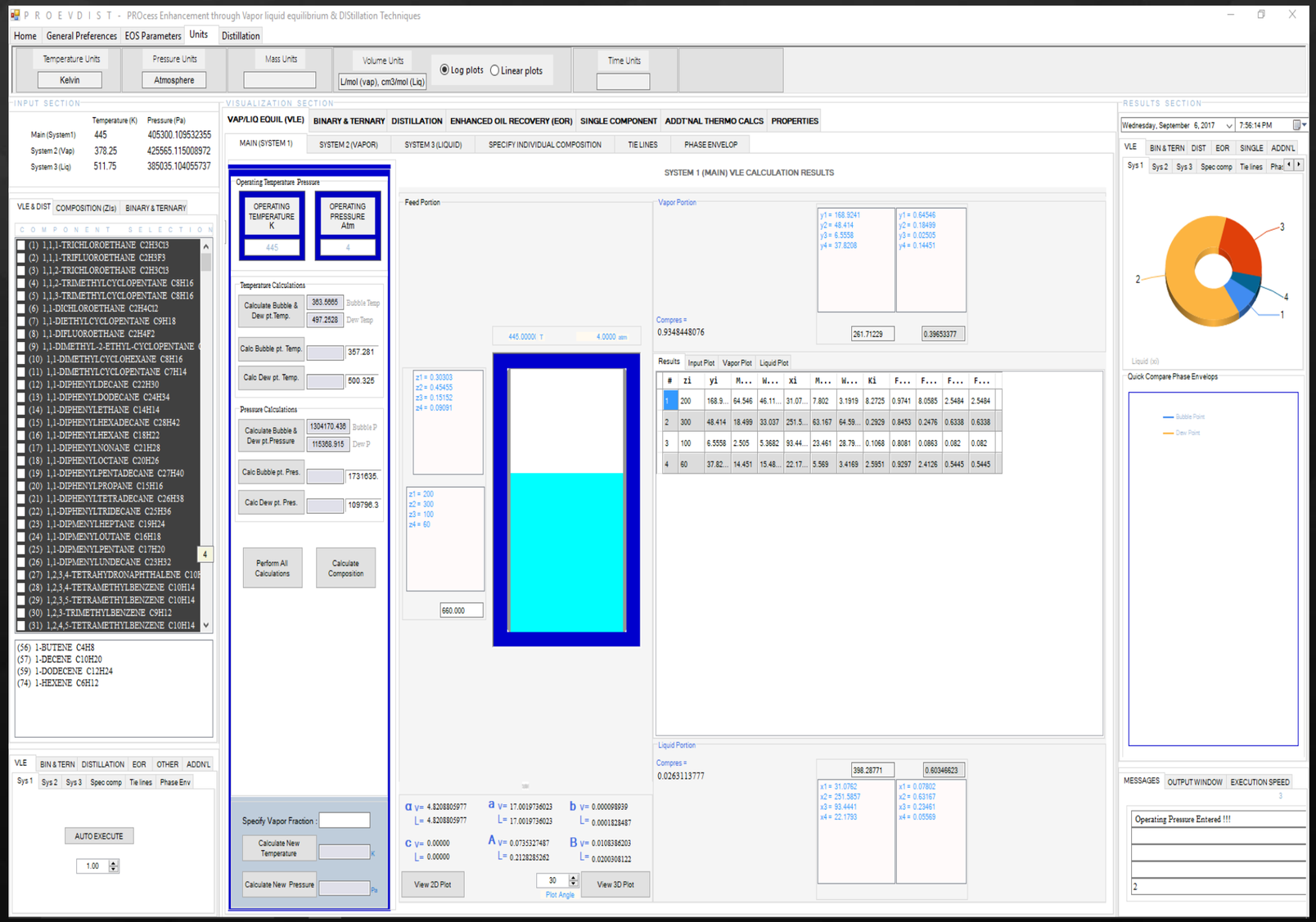
The software package can be used as a teaching tool in universities as it performs Academic-level rigorous computations and graphical displays which were previously tediously performed by hand calculations.

The Software package performs calculations that are applicable to the following industries: Oil and Gas processing such as Refineries, Chemical plants, Olefins and Aromatics and Specialty chemical processes, Enhanced Oil Recovery, Power and Thermal plants as well as the controls and optimization of these facilities.

Explore further details of the software package after the Business Opportunities Section.

***Our software package is being used as a teaching tool in universities as it performs Academic-level rigorous computations.***

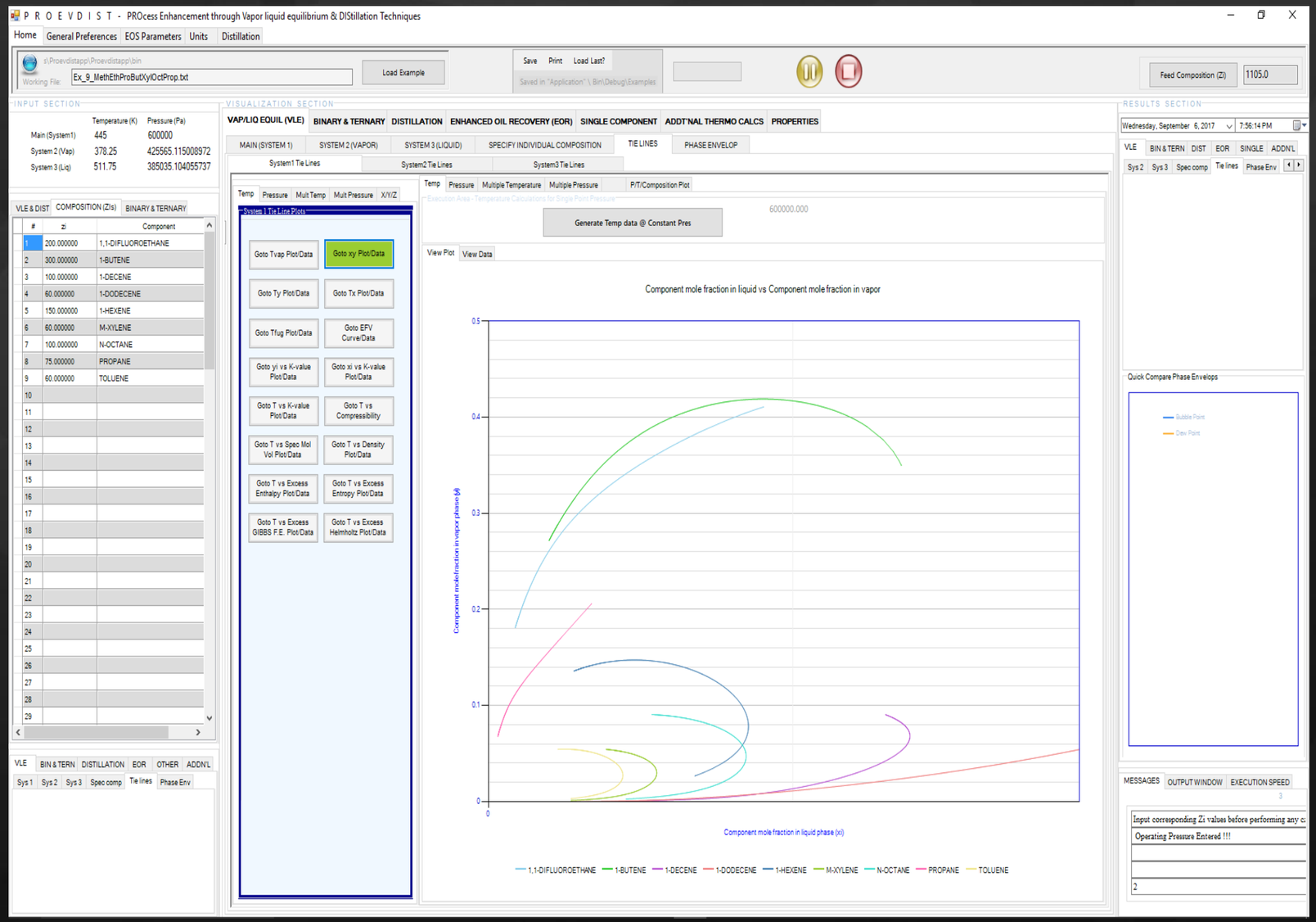
***Oil and Gas: Refineries, Chemical plants, Olefins and Aromatics and Specialty chemical processes, Enhanced Oil Recovery, Thermal & Power plants.***



## VAPOR LIQUID EQUILIBRIUM (VLE)

The software package is the ultimate answer to all your vapor-liquid equilibrium, Distillation and EOR needs.

- The software package is applicable to the following areas:
  - Design of Chemical processes as applicable to any chemical processing facility including but not limited to Oil and Gas, Power plants, Polymer facilities etc.
  - Simulation of existing plant conditions for comparisons to design basis.
  - Armed with the above, our engineers will:
    - Provide an analysis of how far away the process is performing from design conditions.
    - Understand and troubleshoot any issues that are preventing the process from reaching design conditions.




***The software package is the ultimate answer to all your vapor-liquid equilibrium, Distillation, Power and Thermal Calculations and EOR needs.***

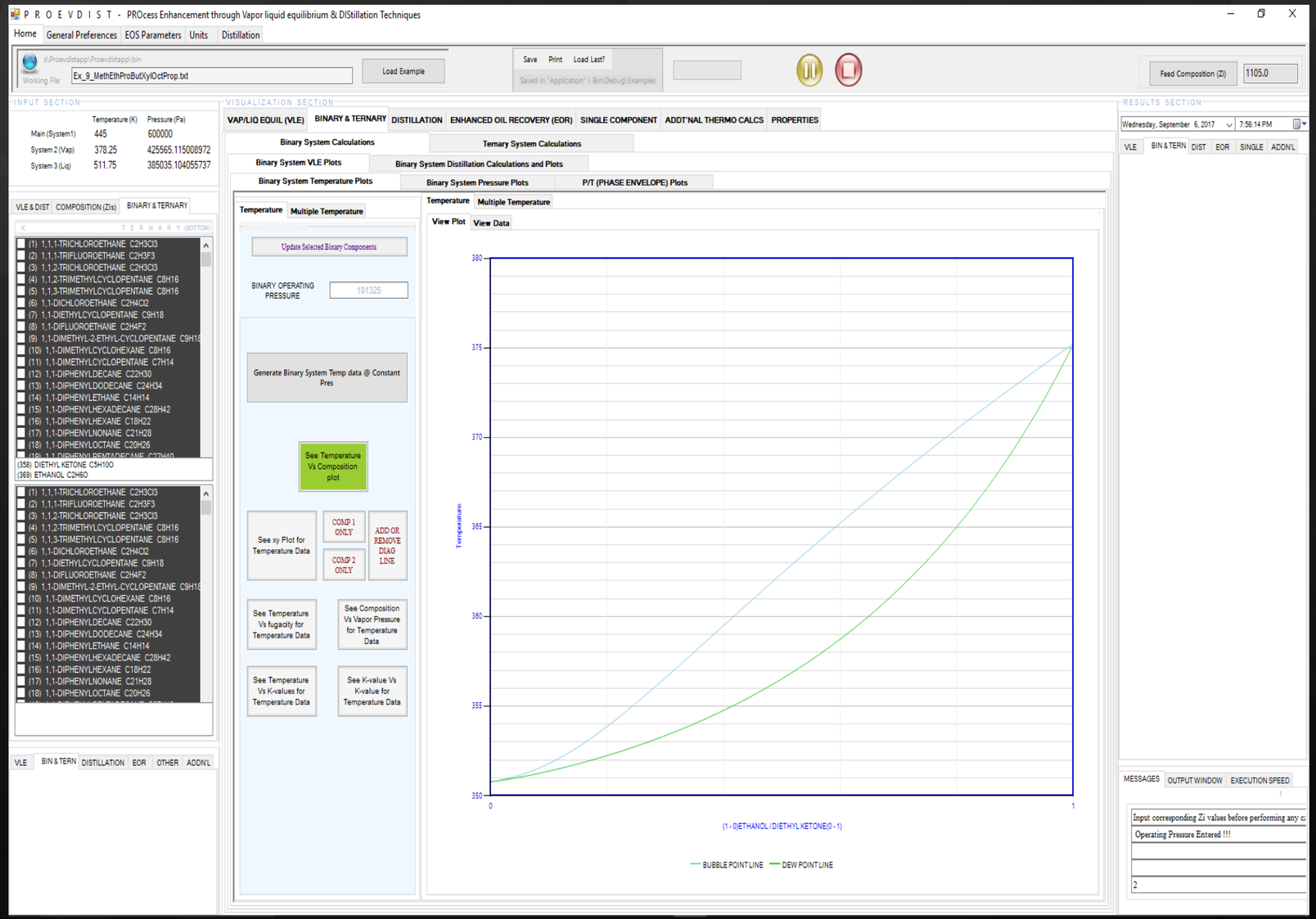
***Design of Chemical processes as applicable to any chemical processing facility including but not limited to Oil and Gas, Power plants, Polymer facilities.***

## VAPOR LIQUID EQUILIBRIUM CONT'D

- Armed with the above, our engineers will:
  - Provide an analysis of how far away the process is performing from design conditions.
  - Work with your team to achieve design conditions. Then push for optimal conditions based on any feed-stock or configuration changes that may not have been captured in the design phase
  - Develop optimal Pressure-compensated temperature curves or relationships for Artificial Intelligence and controls to drive your processes to stable and optimal temperature profiles even with changes in pressure.

***Our Software solution is designed to interphase with all other open system software packages.***

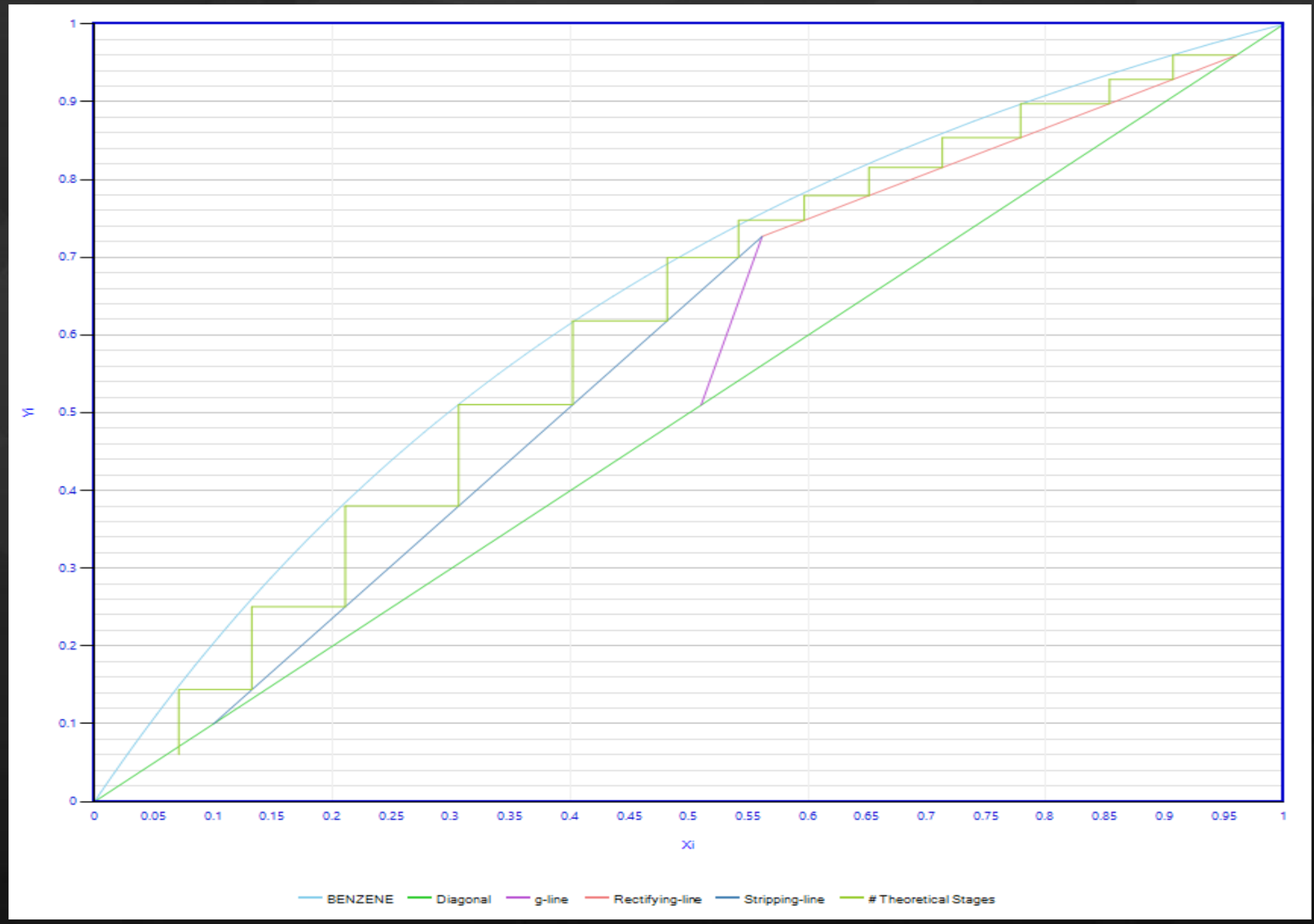
***Thus, it can receive data from and send highly complex and iterative solutions to many other software packages without human intervention.***



## DISTILLATION

The package is being utilized currently in several refineries and chemical plants to provide intelligent controls to stabilize column temperature profiles and save hundreds of thousands to millions of dollars per operating unit.

- The software package is applicable to the following areas:
  - Optimization of Distillation Columns for processes without on-line analyzers for temperature control.
  - Optimal temperature calculations for any other non-reactive processing facilities such as Power plants including Dew point calculations for Polymer processes.
  - Armed with the above, our engineers will:
    - Provide an analysis of how far away the process is performing from design conditions.




***Distillation columns are designed based on the boiling point and other relevant properties of the components in the mixtures being separated.***

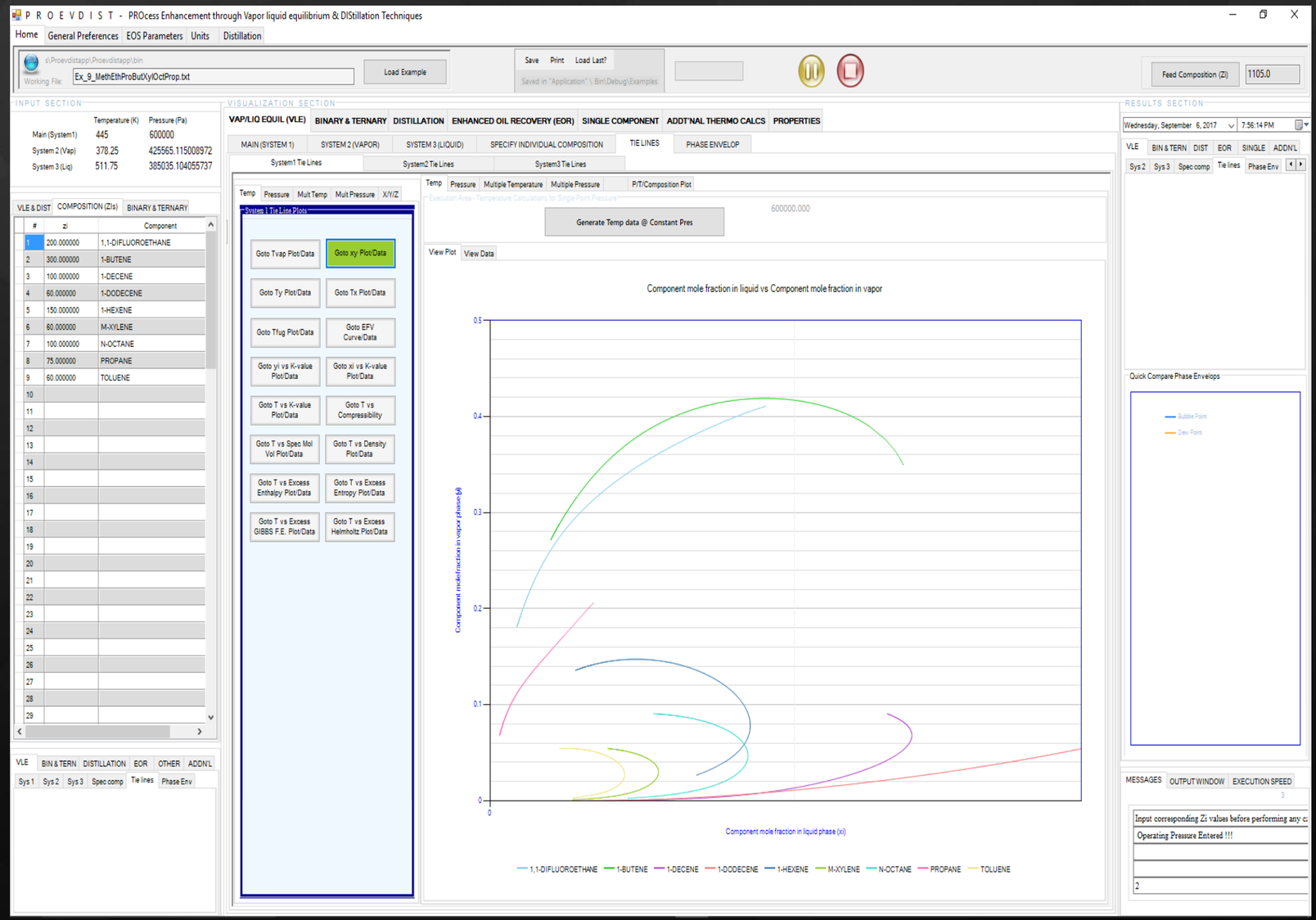
***Thus, the sizes, particularly the height properties of the distillation columns are determined by vapor-liquid equilibrium (VLE) data for the mixture.***

## DISTILLATION CONT'D

- Armed with the above, our engineers will:
  - Provide an analysis of how far away the process is performing from design conditions.
  - Work with your team to achieve design conditions. Then push for optimal conditions based on any feed-stock or configuration changes that may not have been captured in the design phase
  - Develop optimal Pressure-compensated temperature curves or relationships for Artificial Intelligence and controls to drive your processes to stable and optimal temperature profiles even with changes in pressure.

***Distillation is central to many processing plants. Distillation models are used widely in industrial applications.***

***The distillation column can be represented as a stack of dynamic flashes: one for each tray, one for the reboiler and one for the condenser.***

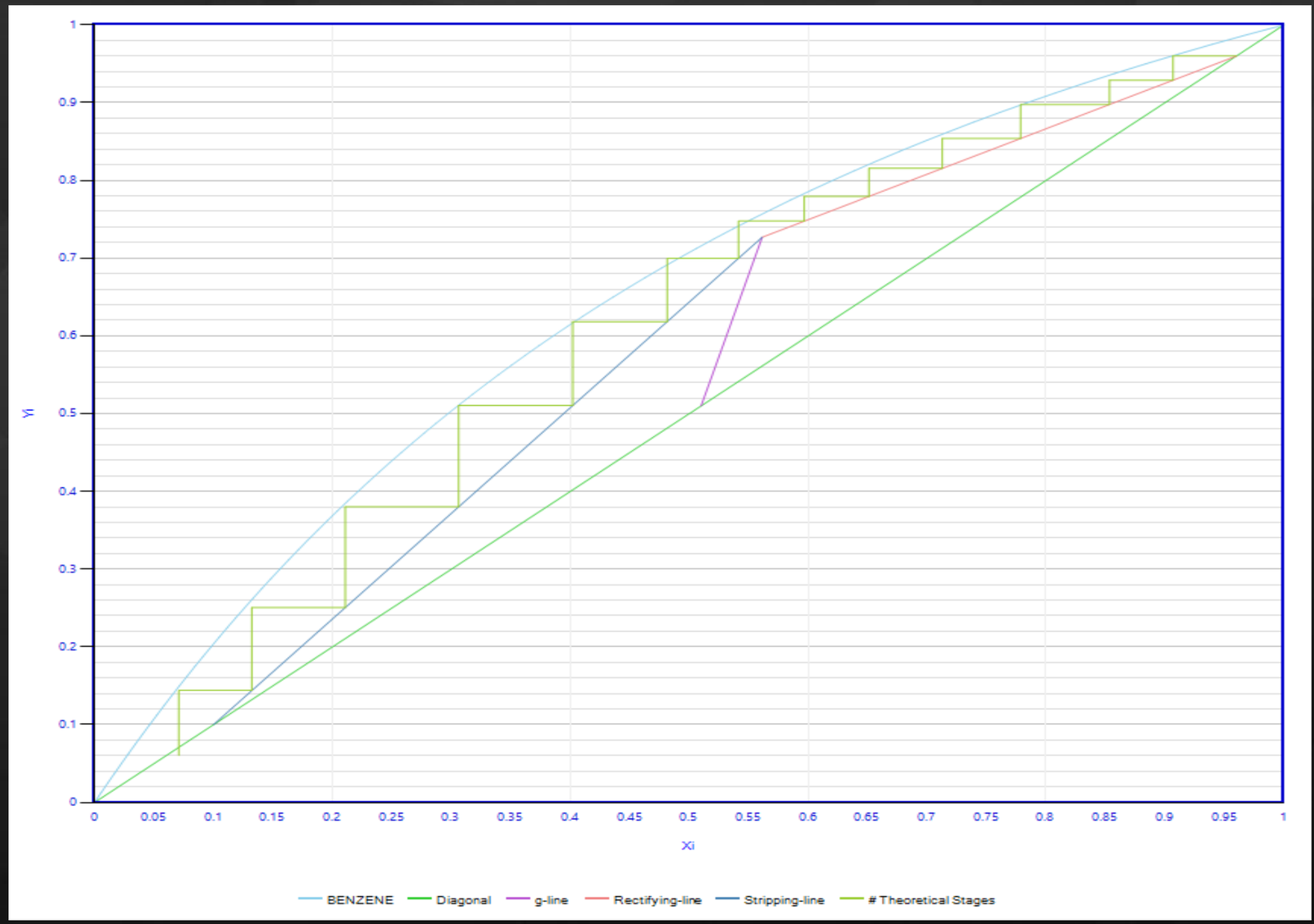


## DISTILLATION CONT'D

Though there is an obvious need for dynamic models, the most common models are steady-state models, which are mainly used in design and retrofitting, but also in some control and planning applications.

The computation of steady-state distillation models is notoriously difficult, the main reason being that it consists of a large number of heavily coupled algebraic equations, the size of which proliferates with the number of components and number of trays.

- Our software package utilized first principles as building blocks to develop highly complex and capable calculations using cubic equations of state (CEOS).
- The software package provides ability to perform continuous distillation and controls simulation for thousands of component mixtures.




***Our software package is one of the few that can simulate batch distillation to produce Laboratory quality data and, in some instances, can be used in its place.***

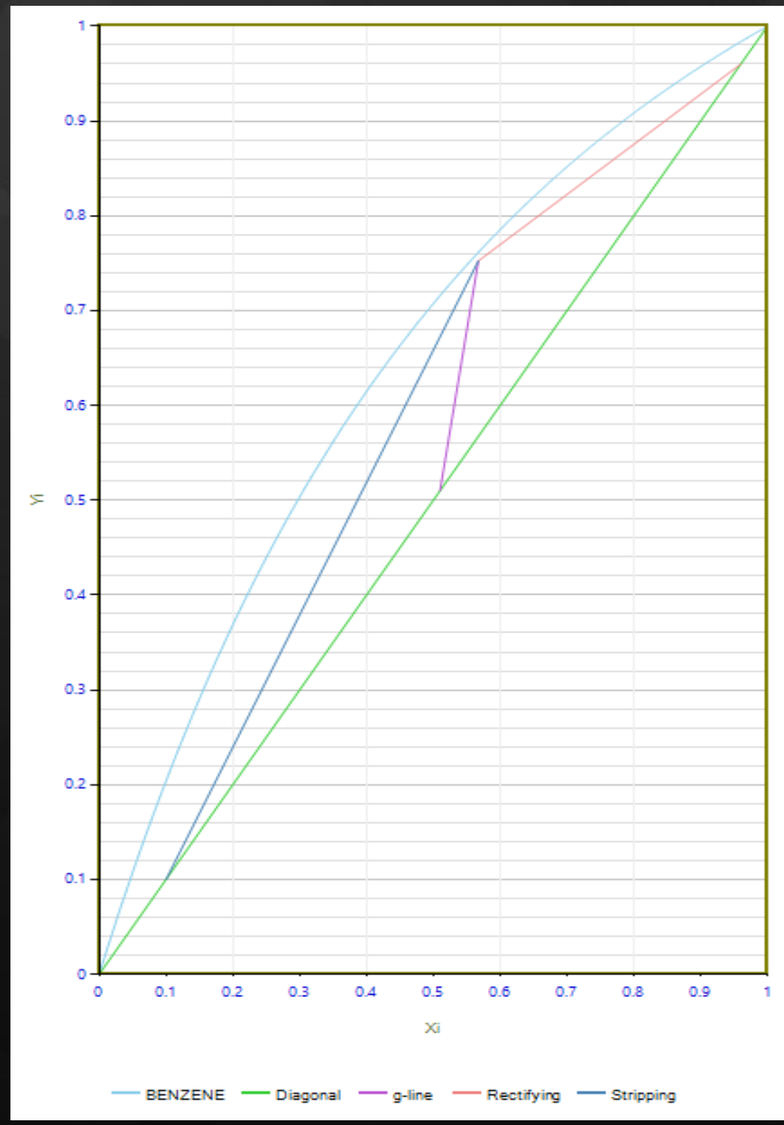
***Our software package provides isothermal (constant temperature) and isobaric (constant pressure) tie line calculations for any mixture.***

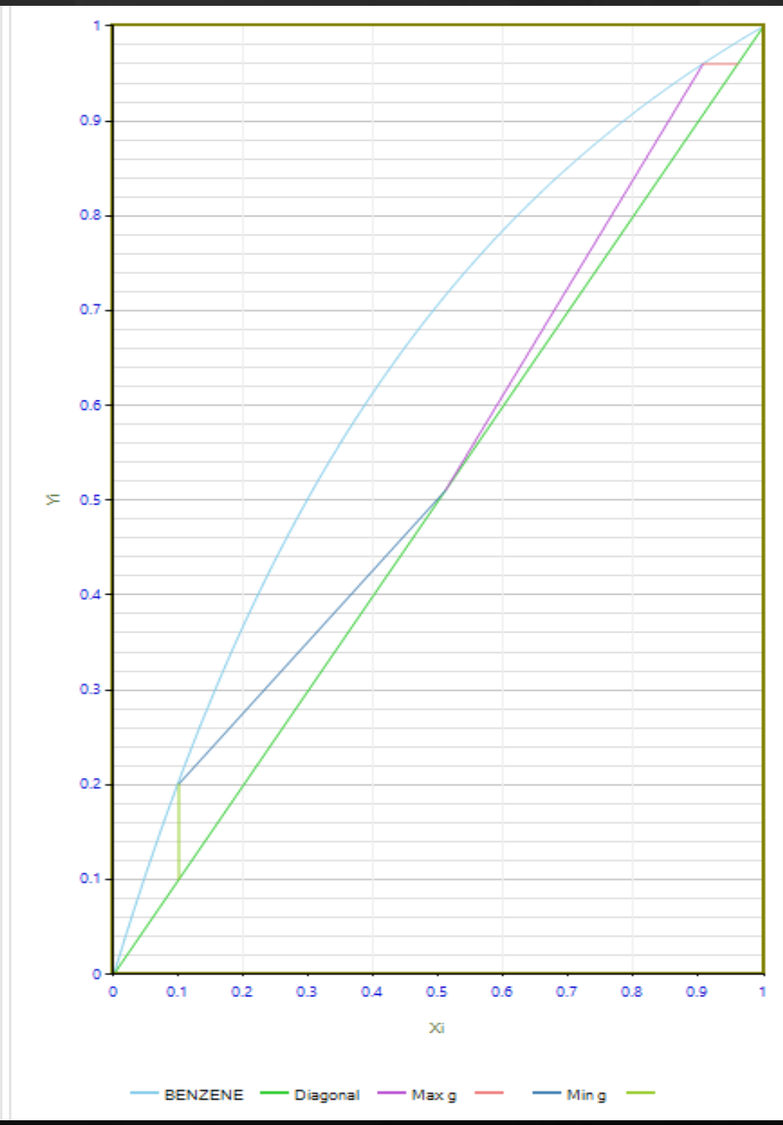
## ENHANCED OIL RECOVERY

- The software package is applicable to the following areas:
  - Calculations of detailed compositional analyses to determine type or characteristics of Crude Oil or Natural gas composition.
  - Simulation of secondary or tertiary oil recovery for thermal, chemical or gas injection reservoirs.
  - Perform compositional tight oil simulator that rigorously models pressure dependent nanopore-impacted rock and fluid properties, such as suppression of bubble point pressure, decrease of liquid density, and reduction of oil viscosity as well as their interactions with pore space compaction.
  - We provide a model of vapor-liquid equilibrium with capillarity effect, extended vapor-liquid flash calculation with implementations and evaluation of capillary pressure for tight oil reservoirs.

***We provide extended vapor-liquid flash calculation with implementations and evaluation of capillary pressure for tight oil reservoirs.***

***We Perform compositional tight oil simulator that rigorously models pressure dependent nanopore-impacted rock and fluid properties.***

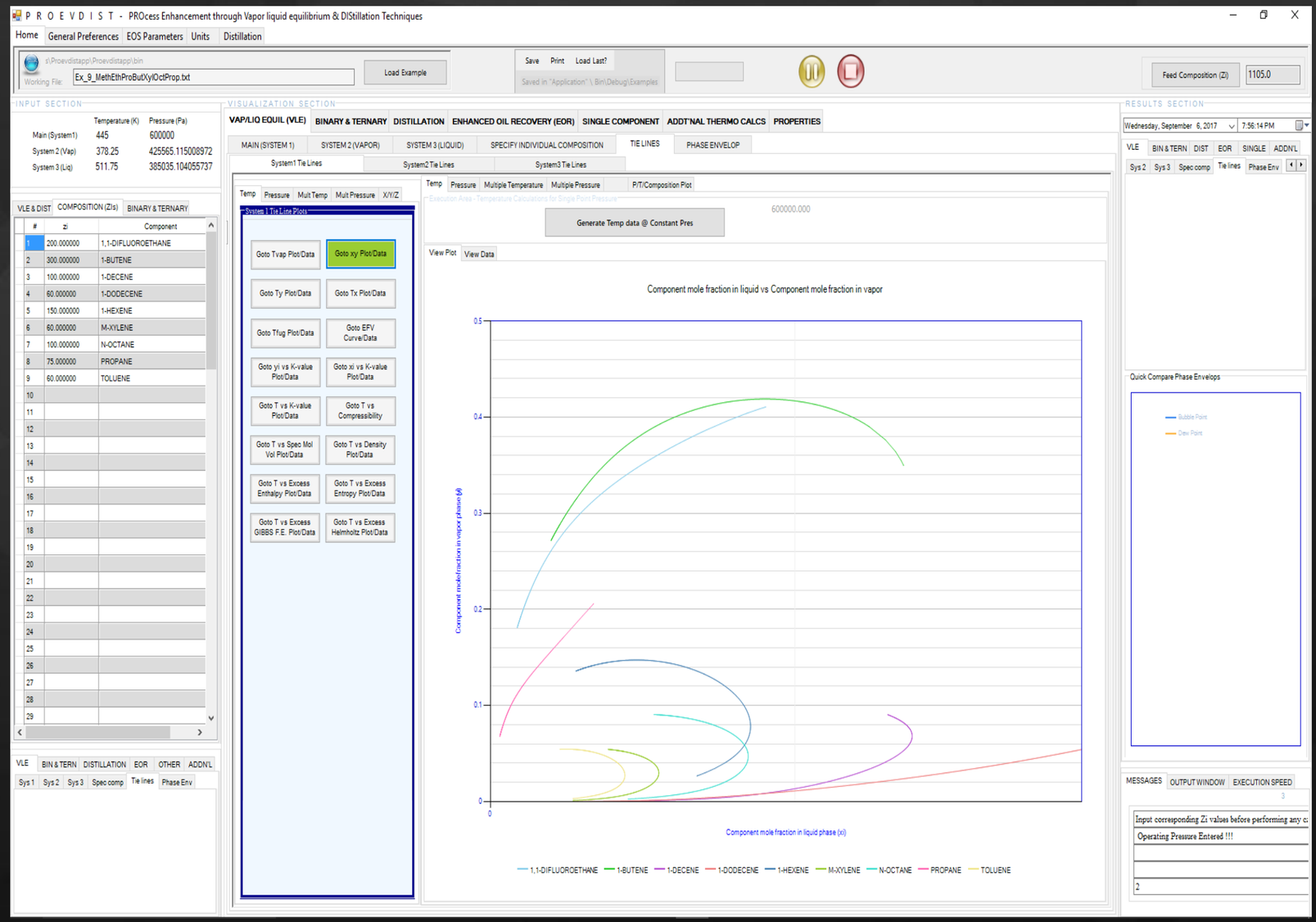


## ENHANCED OIL RECOVERY (EOR)

– Armed with the above, our engineers will:

- Calibrate simulation parameters to mimic reservoir conditions.
- Perform detailed compositional analysis while varying certain parameters to determine optimal recovery conditions.
- Characterization of oil and polymer flow behavior using data from laboratory measurements.
- Simulate CO2-EOR in Tight Oil Reservoirs




***Static and Dynamic Reservoir models are key elements for evaluating and selecting any future recovery options (infill wells, improved oil recovery, enhanced oil recovery)***

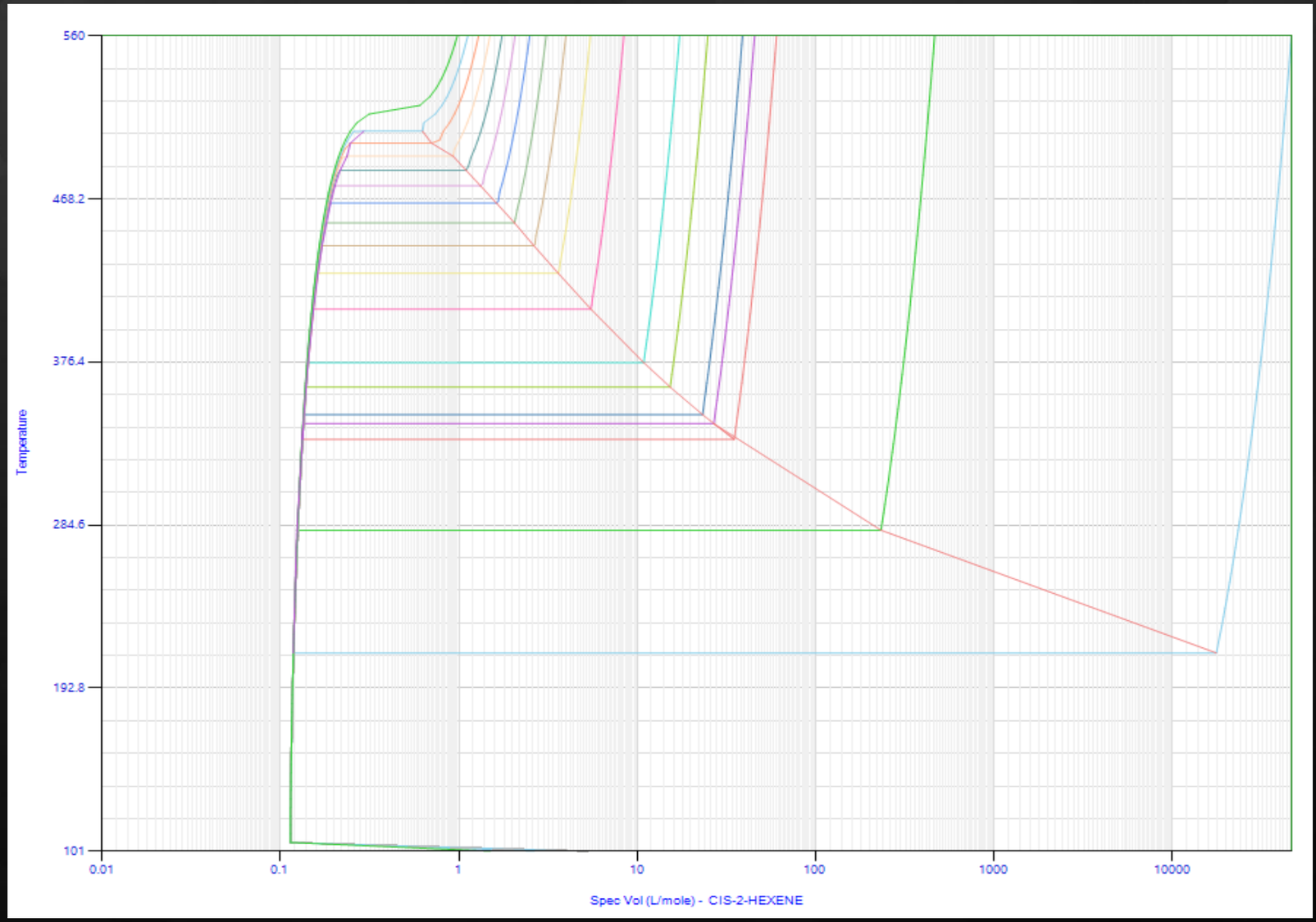
***Compositional model is a model which explicitly acknowledges the actual compositions of oil and gas phases due to their complicated PVT behavior.***

## POWER & THERMAL FACILITIES

- The software package is applicable to the following areas:
  - Precise thermodynamic properties of water and many other substances
  - Plotting of Temp- Specific Vol, Pressure – Specific Vol, Temperature-Enthalpy, Pressure-Enthalpy relationships for water and many other components.
  - Graphical plots that are building blocks for calculations of thermodynamic cycles including Carnot, Gas Turbine, Diesel, Rankine cycles and many others.
  - Armed with the above, our engineers will:
    - Develop the thermodynamic plots for your specific process.

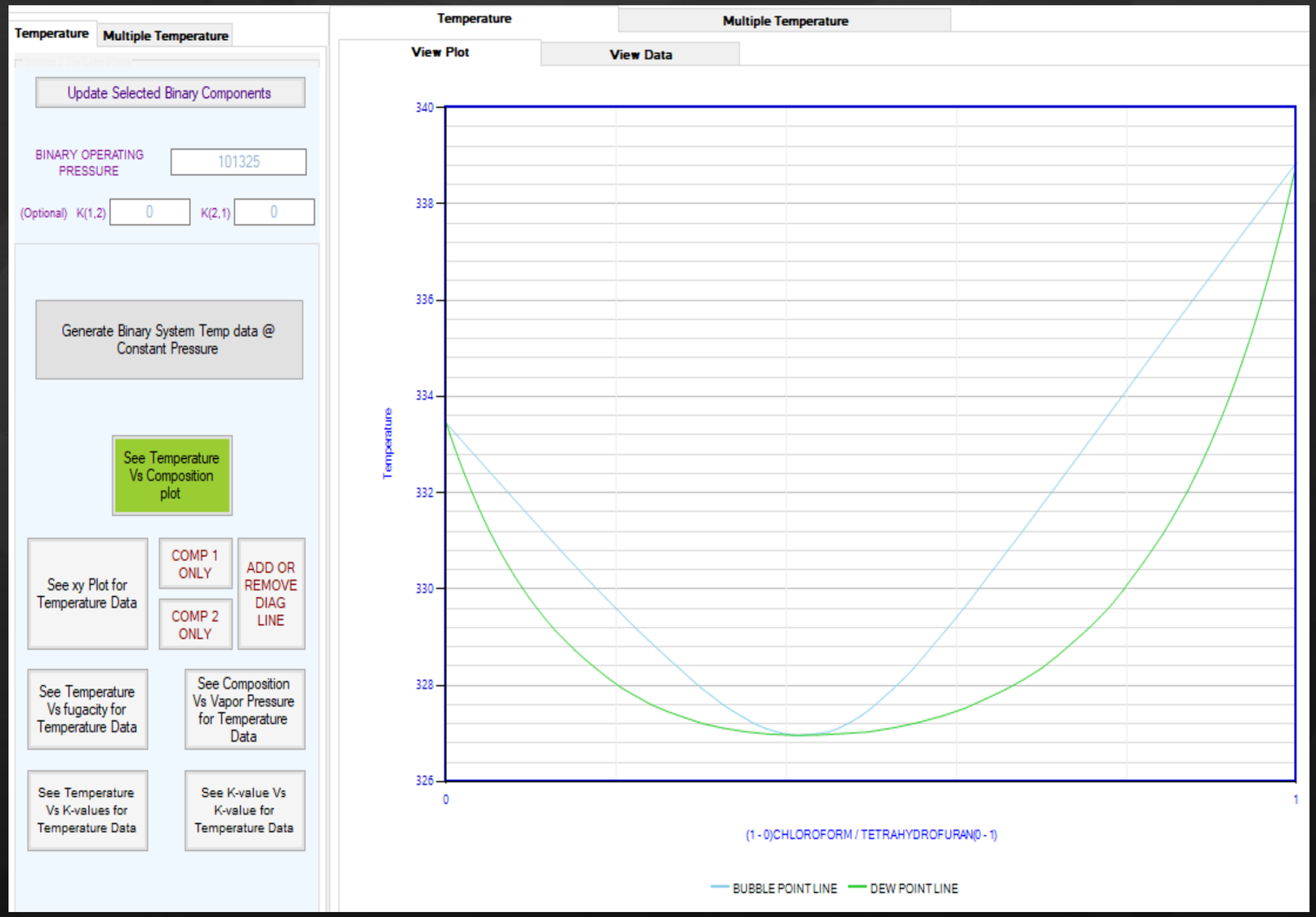
***Plotting of Temp-Specific Vol, Pressure – Specific Vol, Temperature-Enthalpy, Pressure-Enthalpy relationships for hundreds of single components.***

***Perform efficiency, work and energy related calculations for your specific facility to determine where to operate the process optimally.***



## POWER & THERMAL FACILITIES

- Armed with the above, our engineers will:
  - Develop the thermodynamic plots for your specific process.
  - Perform detailed temperature, pressure, specific volume calculations relating to water or other working fluid expansions.
  - Perform efficiency, work and energy related calculations for your specific facility to determine where to operate the process for heat recovery and maximum efficiency.




***Calculation of Precise thermodynamic properties of water and hundreds of other single components and mixtures of working fluids.***

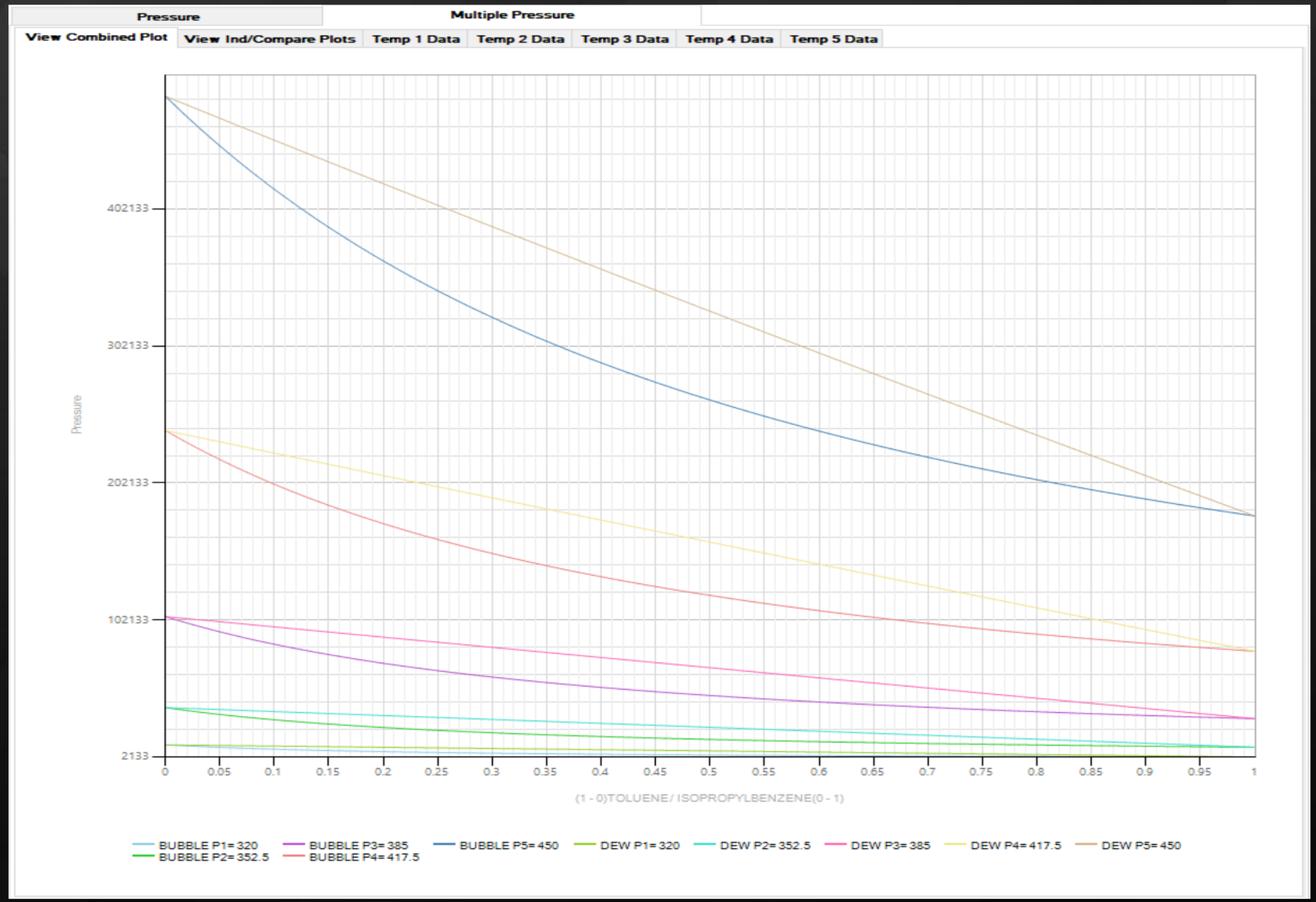
***Graphical plots that are building blocks for calculations of thermodynamic cycles including Carnot, Gas Turbine, Diesel, Rankine cycles.***

## ENVIRONMENTAL ENGINEERING SOLUTIONS

- Environmental Remediation.
- Environmental spill cleanup using the proprietary SWR solution.
- Environmental monitoring. Concerns about pollution? We will bring our monitoring equipment and perform data collection and analysis.
- Help plan your project and provide you with innovative and cost-effective solutions to meet your energy, water and transportation needs.
- The software package is applicable to the following areas:
  - Calculation of air-borne contaminants based on ambient or process conditions.
  - We perform environmental engineering calculations to determine contaminant amounts.
  - Assist in the controls and optimization of Waste water treatment facilities.

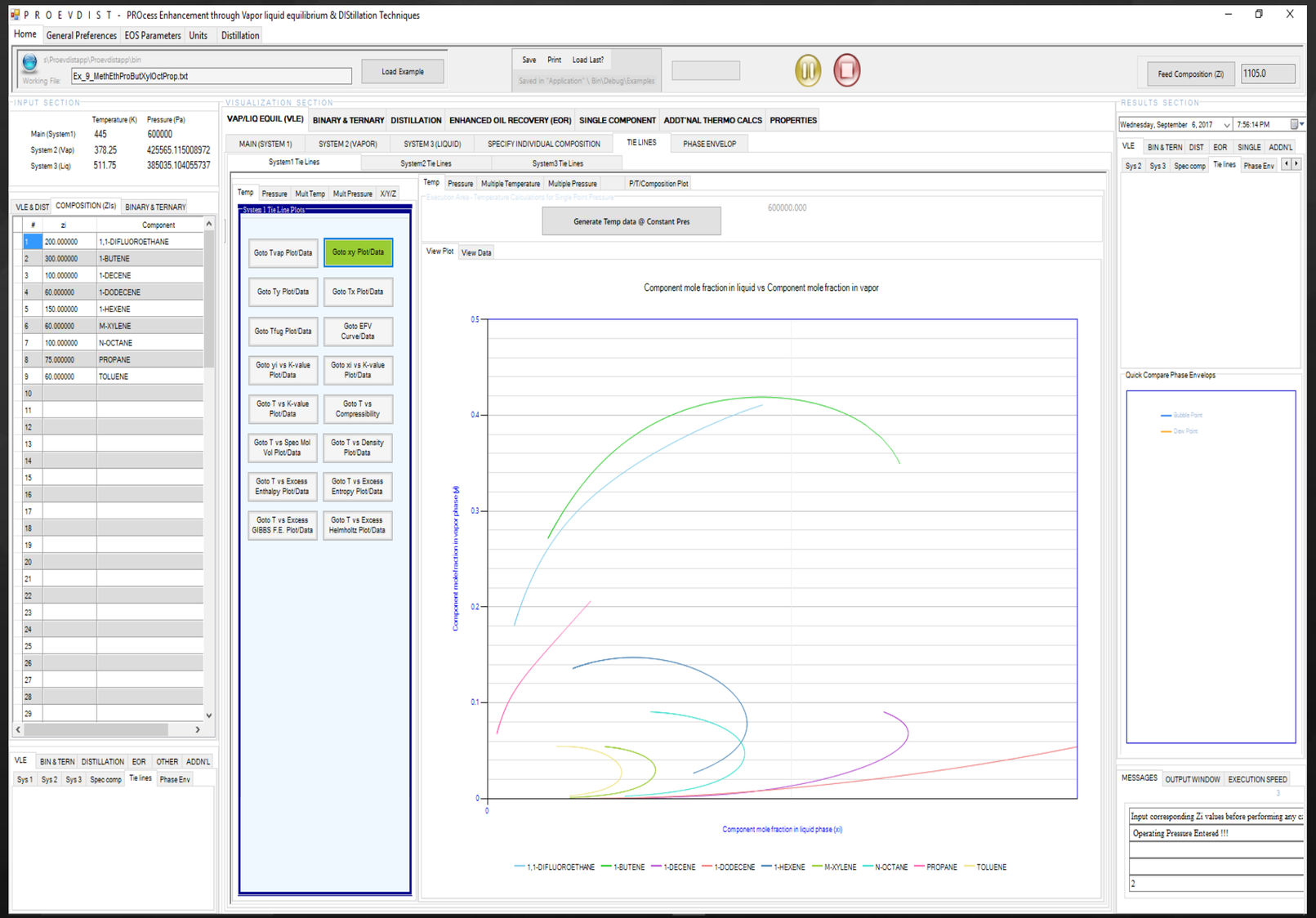
***Our Software solution is designed to interphase with all other open system software packages.***

***Thus, it can receive data from and send highly complex and iterative solutions to many other software packages without human intervention.***



## ENVIRONMENTAL ENGINEERING SOLUTIONS (CONT'D)

- Our passion drives our work around the globe. We take the time to truly understand each project—learning its past, adapting to present conditions, and preparing for future shifts. So whether we're collaborating with you on a complex permit application, monitoring a site during construction, or designing a decommissioning plan, you can count on our team to help you find the smartest solution for the project and community it supports.
  - Stream restoration and shoreline stabilization provide valuable results in municipalities required to meet assigned waste load allocations for phosphorus, nitrogen, and sediment.




***We've got the environment down to a science. Nontraditional solutions can deliver multiple unexpected benefits.***

***It's no secret that our success is relationship based - built on good communication and long-term partnership with communities.***

PURE COMPONENTS:

Vapor-Liquid Equilibrium curves for pure components are Pressure-Temperature plots showing the variation of boiling/bubbling temperatures with pressures.

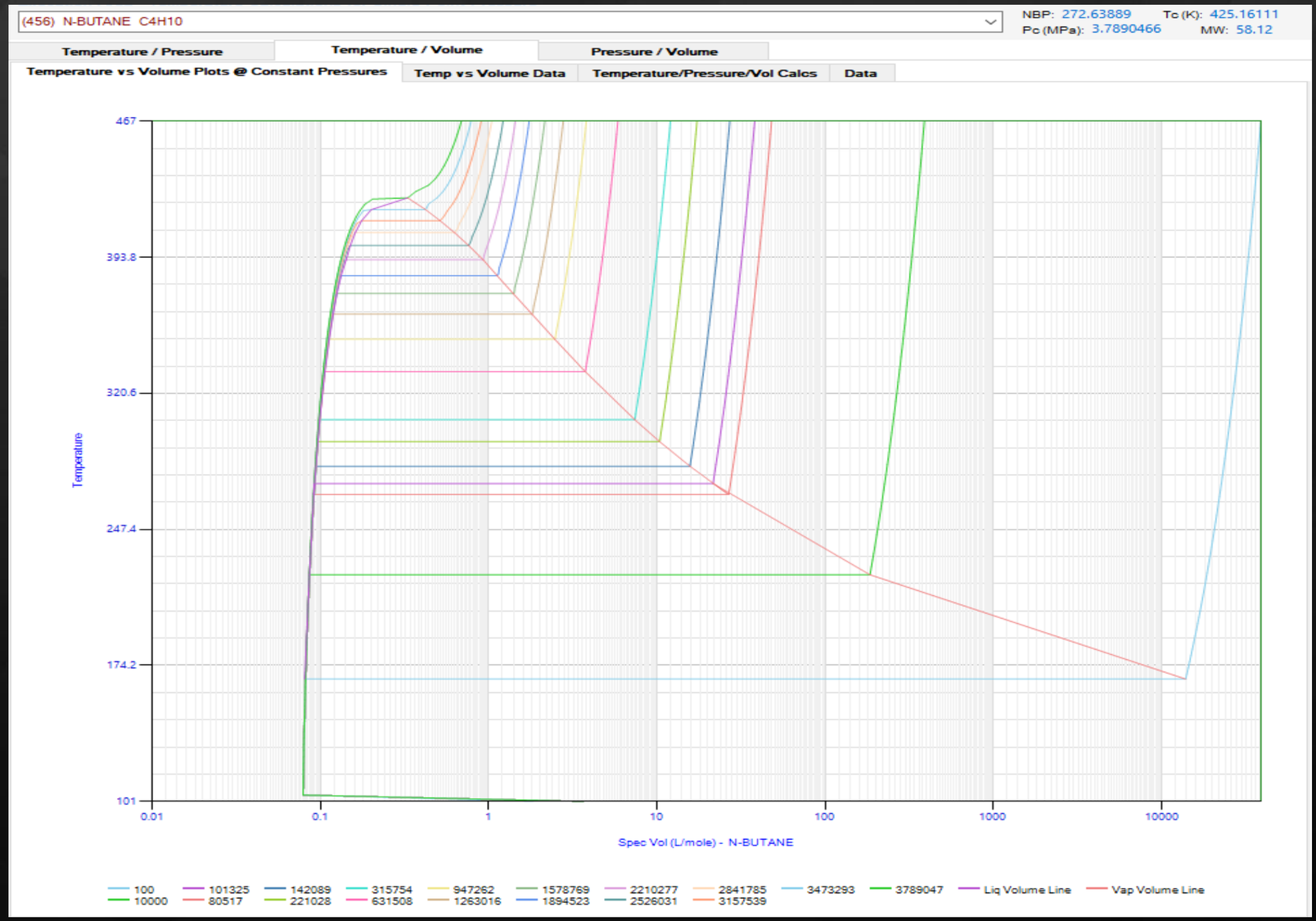
These curves end at critical point corresponding to critical temperature and critical pressure The component can be vaporized at a constant temperature lower than critical temperature from an initial pressure beyond critical pressure by decreasing the pressure.

Similarly, compound can be liquefied at a constant pressure below critical pressure from an initial temperature higher than critical temperature by decreasing the temperature.

Beyond critical point, the compound cannot be characterized as liquid or vapor thus resulting in absence of vapor-liquid equilibrium and VLE curve beyond critical point.

***We provide T-v and P-v Diagrams for several other pure components as well as related calculations.***

***Beyond critical point, the compound cannot be characterized as liquid or vapor thus resulting in absence of vapor-liquid equilibrium.***



PURE COMPONENTS:

We provide T-v and P-v Diagrams for several other pure components as well as related calculations.

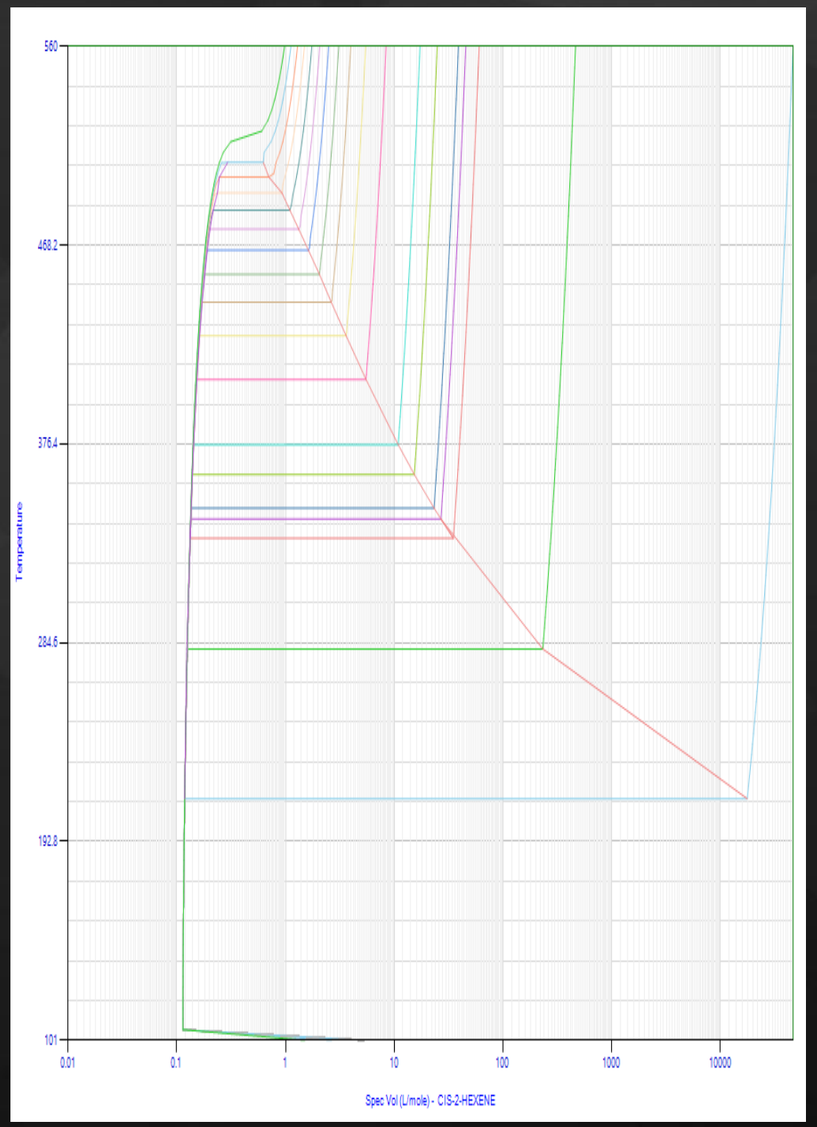
Comparison of multiple single component boiling points up to their critical points.

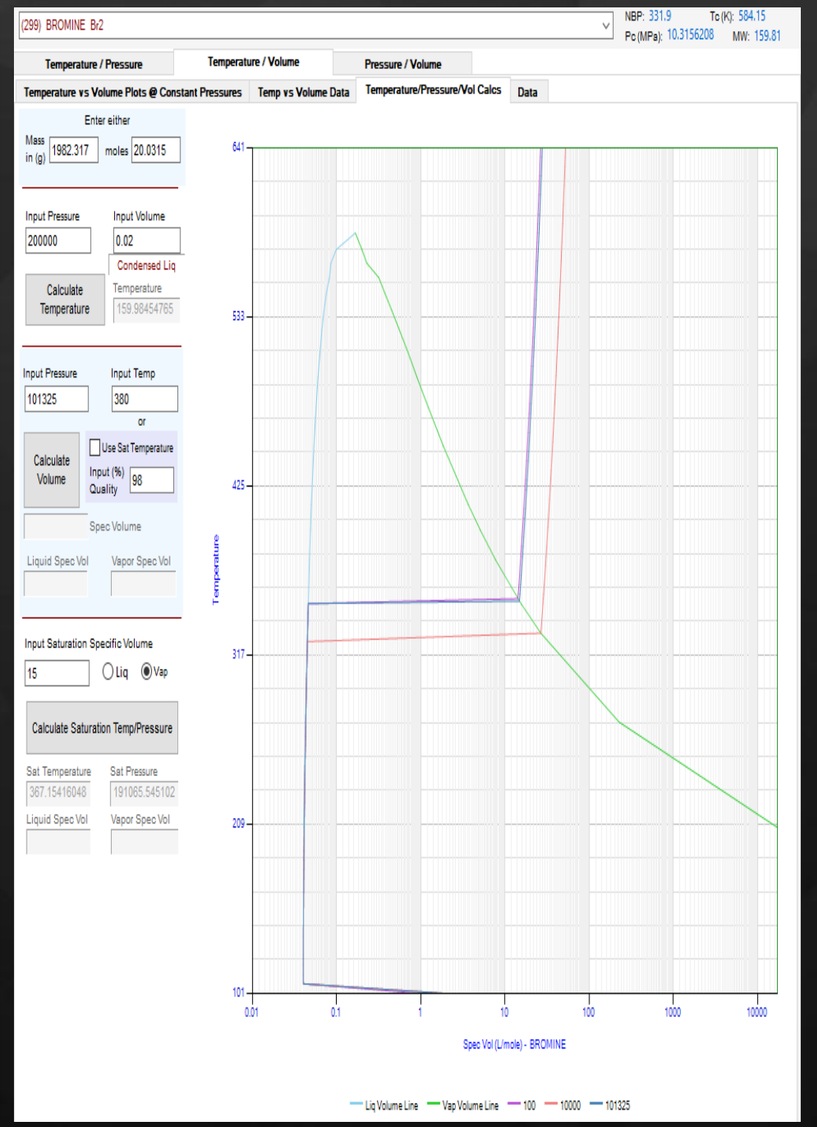
This gives a quick graphical representation of the similarities and ease or difficulty of separation between components.

Calculation of precise thermodynamic properties of water (For Boilers and Thermal facilities) and many other substances.

Plots of Liquid-vapor saturation curve in the temperature-specific volume plane.

Illustrations of liquid-vapor phase changes at constant pressure are shown on the plots to the right.




***Calculation of precise thermodynamic properties of water (For Boilers and Thermal facilities) and many other substances.***

***Plots of Liquid-vapor saturation curve in the temperature-specific volume plane.***

BINARY COMPONENTS:

Concentration diagram (x-y plot) and concentration diagram (x-y plot) data.

Temperature-concentration diagram (T-x-y plot) and Temperature-concentration diagram (T-x-y plot) data

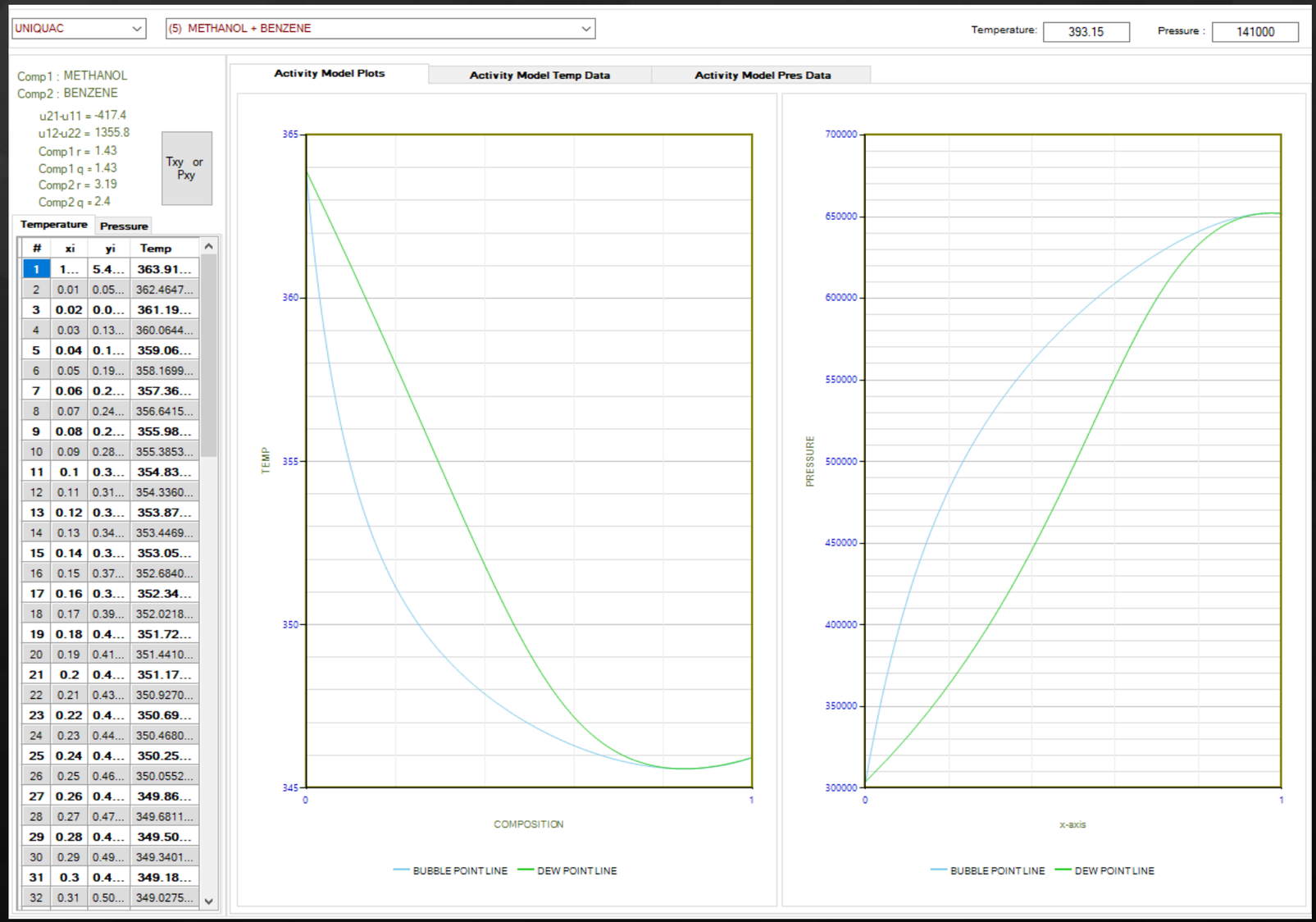
Enthalpy-Concentration diagram (H-x-y plot) and Enthalpy-Concentration diagram (H-x-y plot) data.

Other VLE properties data like liquid and vapor compressibility factors, liquid and vapor densities and liquid and vapor molecular weights.

Phase envelope data for binary mixtures including highly non-ideal and azeotropic mixtures.

***Other VLE properties data like liquid and vapor compressibility factors, liquid and vapor densities and liquid and vapor molecular weights.***

***Enthalpy-Concentration diagram (H-x-y plot) and Enthalpy-Concentration diagram (H-x-y plot) data.***




| # | xi | yi | Temp |
|---|---|---|---|
| 1 | 1... | 5.4... | 363.91... |
| 2 | 0.01 | 0.05... | 362.4647... |
| 3 | 0.02 | 0.0... | 361.19... |
| 4 | 0.03 | 0.13... | 360.0644... |
| 5 | 0.04 | 0.1... | 359.06... |
| 6 | 0.05 | 0.19... | 358.1699... |
| 7 | 0.06 | 0.2... | 357.36... |
| 8 | 0.07 | 0.24... | 356.6415... |
| 9 | 0.08 | 0.2... | 355.98... |
| 10 | 0.09 | 0.28... | 355.3853... |
| 11 | 0.1 | 0.3... | 354.83... |
| 12 | 0.11 | 0.31... | 354.3360... |
| 13 | 0.12 | 0.3... | 353.87... |
| 14 | 0.13 | 0.34... | 353.4469... |
| 15 | 0.14 | 0.3... | 353.05... |
| 16 | 0.15 | 0.37... | 352.6840... |
| 17 | 0.16 | 0.3... | 352.34... |
| 18 | 0.17 | 0.39... | 352.0218... |
| 19 | 0.18 | 0.4... | 351.72... |
| 20 | 0.19 | 0.41... | 351.4410... |
| 21 | 0.2 | 0.4... | 351.17... |
| 22 | 0.21 | 0.43... | 350.9270... |
| 23 | 0.22 | 0.4... | 350.69... |
| 24 | 0.23 | 0.44... | 350.4680... |
| 25 | 0.24 | 0.4... | 350.25... |
| 26 | 0.25 | 0.46... | 350.0552... |
| 27 | 0.26 | 0.4... | 349.86... |
| 28 | 0.27 | 0.47... | 349.6811... |
| 29 | 0.28 | 0.4... | 349.50... |
| 30 | 0.29 | 0.49... | 349.3401... |
| 31 | 0.3 | 0.4... | 349.18... |
| 32 | 0.31 | 0.50... | 349.0275... |

BINARY COMPONENTS:

User has ability to produce data for up to 800 sample points.

User has ability to change binary interaction parameters.

Azeotropic binary calculation using software package.

Various plots and properties are calculated at several conditions.

Multiple Pressure or Temperature curves are developed for comparisons.

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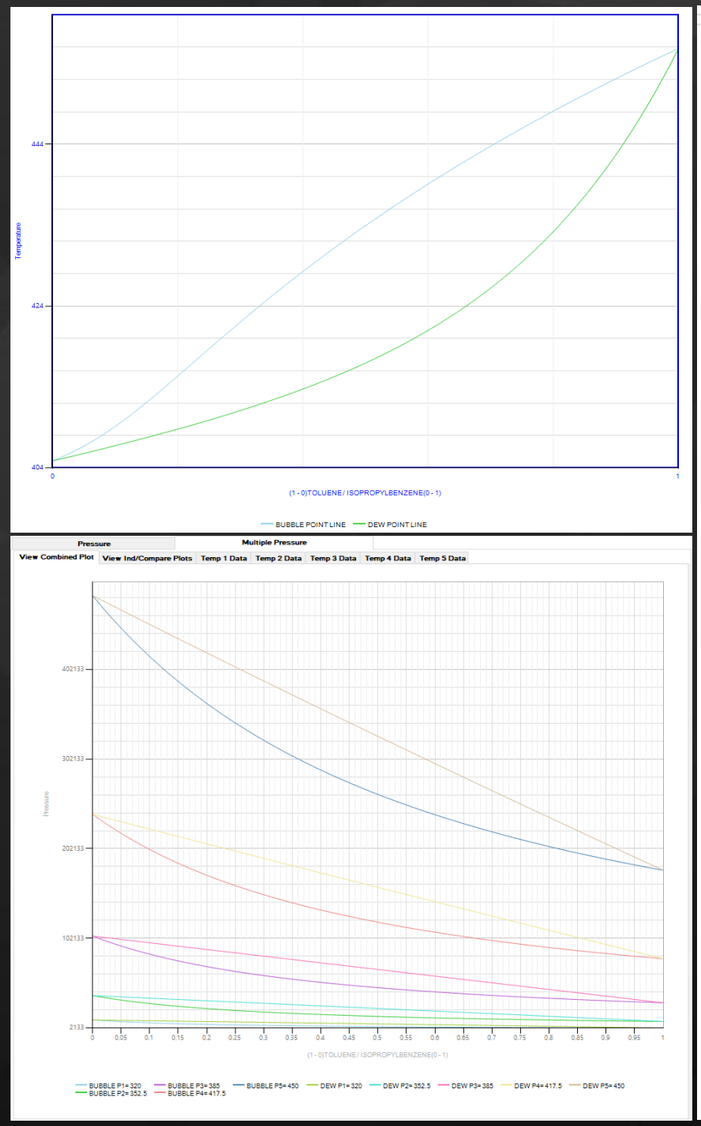
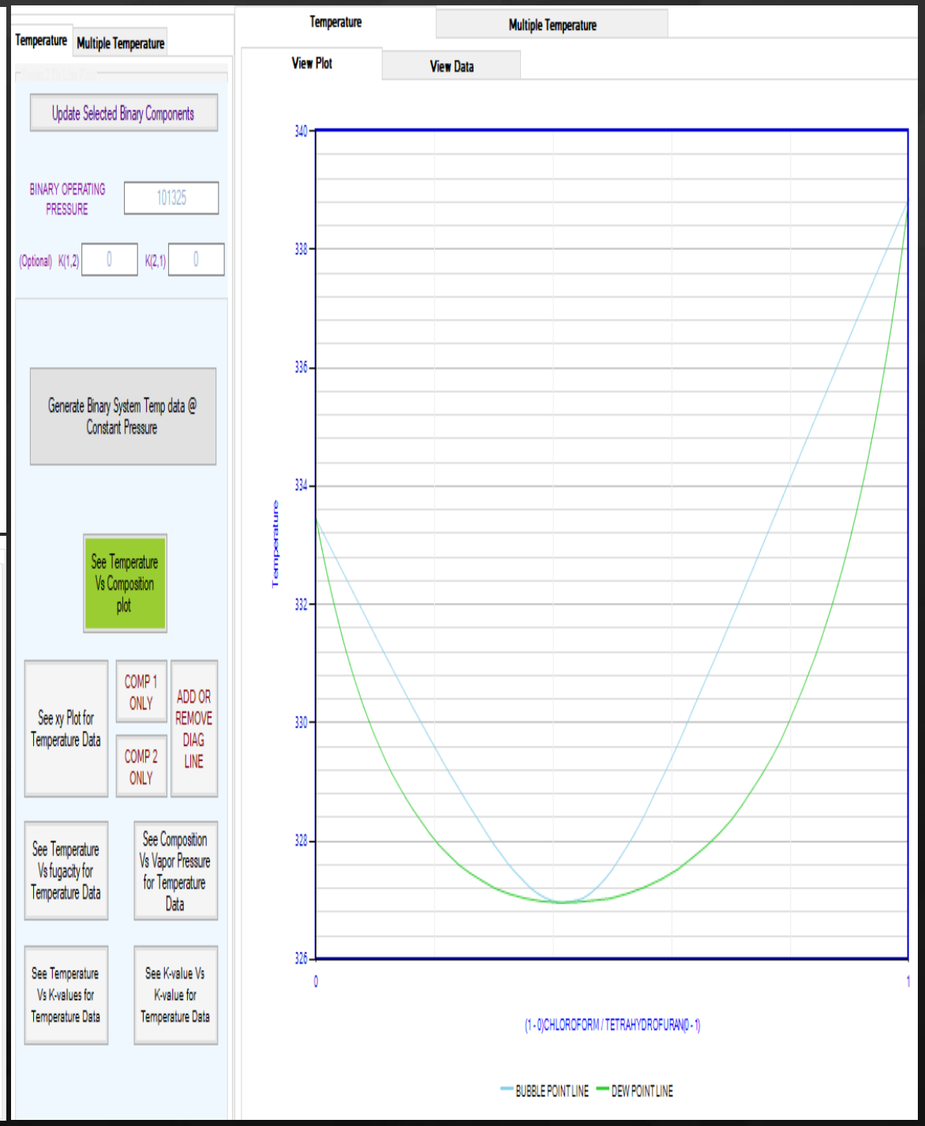









***User has ability to change binary interaction parameters.***

***Azeotropic binary calculation using software package.***

***Various plots and properties are calculated at several conditions.***

***Multiple Pressure or Temperature curves are developed for comparisons.***

MULTI COMPONENTS:

Vapor-Liquid Equilibrium curves for multi-component (including hydrocarbon) mixtures are generally closed envelopes known as Phase envelopes comprising of bubble point curve and dew point curve.

Bubble and Dew point Temperature and Pressure calculations at any operating condition.

Tie line plots for any mixture of components under study

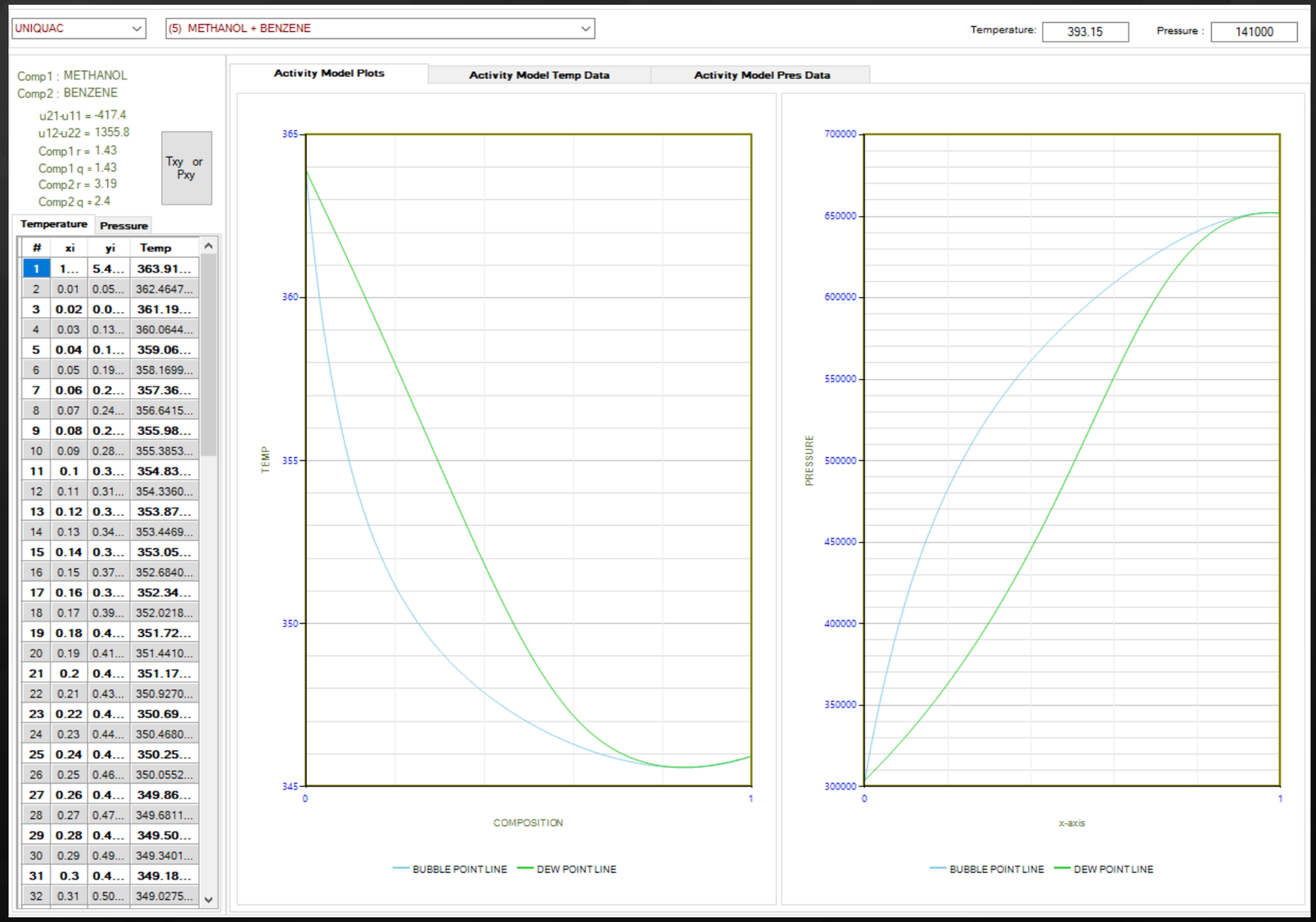
Enthalpy-Concentration diagram (H-x-y plot) and Enthalpy-Concentration diagram (H-x-y plot) data.

Other VLE properties data like liquid and vapor compressibility factors, liquid and vapor densities and liquid and vapor molecular weights.

Phase envelope data for binary mixtures including highly non-ideal and azeotropic mixtures.

***Bubble and Dew point Temperature and Pressure calculations at any operating condition.***

***Phase envelope data for binary mixtures including highly non-ideal and azeotropic mixtures.***



## MULTI-COMPONENTS CONT'D:

We provide T-v and P-v Diagrams for several other pure components as well as related calculations.

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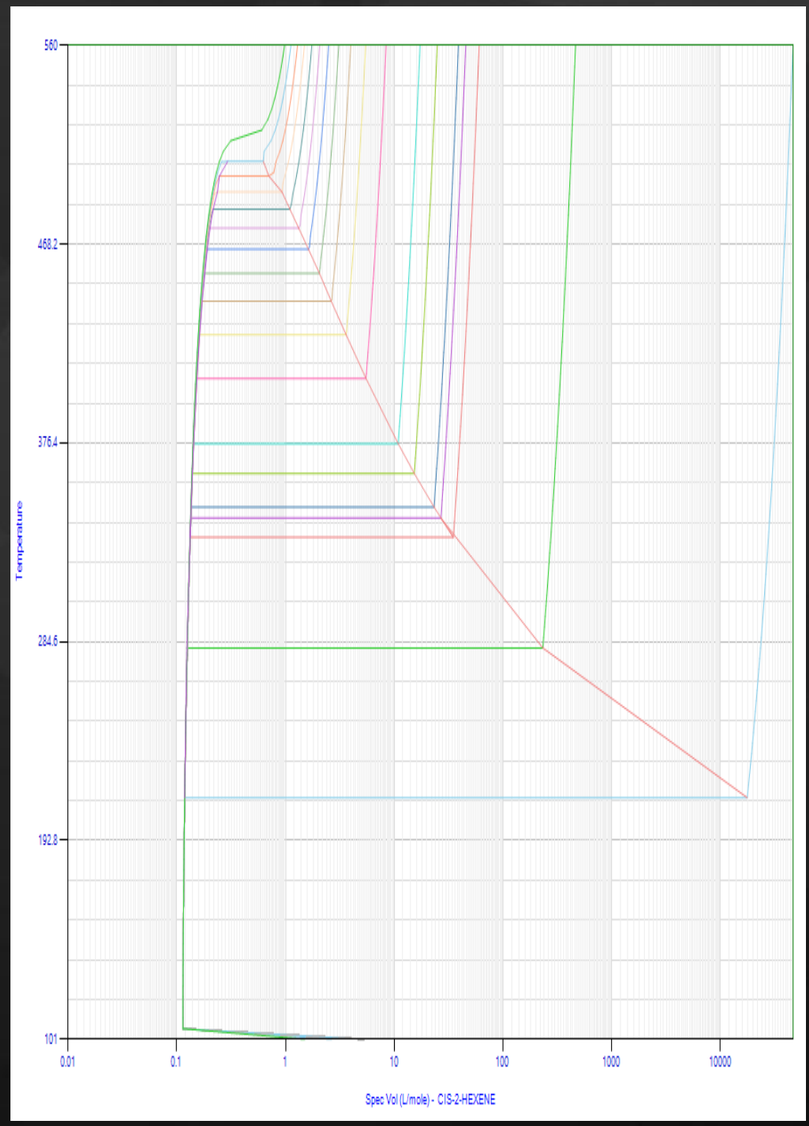
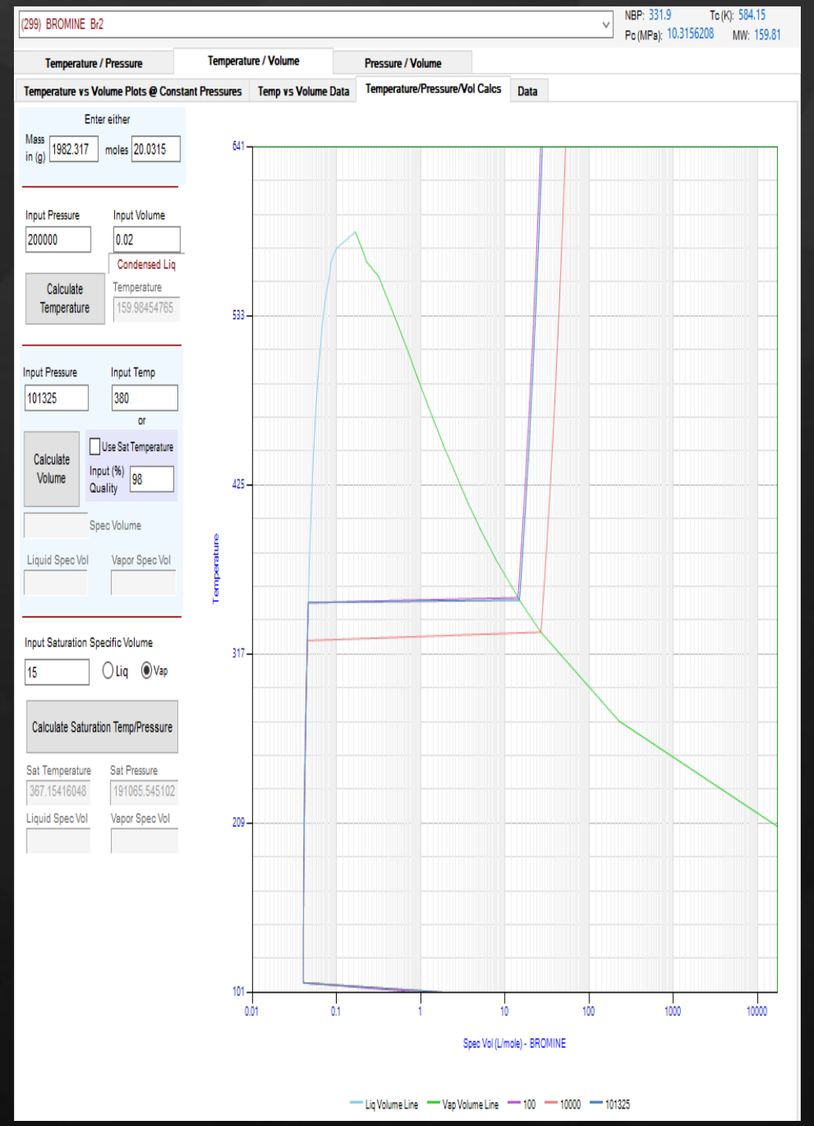
This gives a quick graphical representation of the similarities and ease or difficulty of separation between components.

Calculation of precise thermodynamic properties of water (For Boilers and Thermal facilities) and many other substances.

Plots of Liquid-vapor saturation curve in the temperature-specific volume plane.

Illustrations of liquid-vapor phase changes at constant pressure are shown on the plots to the right.




***This gives a quick graphical representation of the similarities and ease or difficulty of separation between components.***

***Comparison of multiple single component boiling points up to their critical points.***

## OTHER SERVICES:

Concentration diagram (x-y plot) and concentration diagram (x-y plot) data.

Temperature-concentration diagram (T-x-y plot) and Temperature-concentration diagram (T-x-y plot) data

We provide several other engineering services including tank building, maintenance and cleanup.

We provide several other engineering services including pipeline and tank monitoring using our proprietary software calculations.

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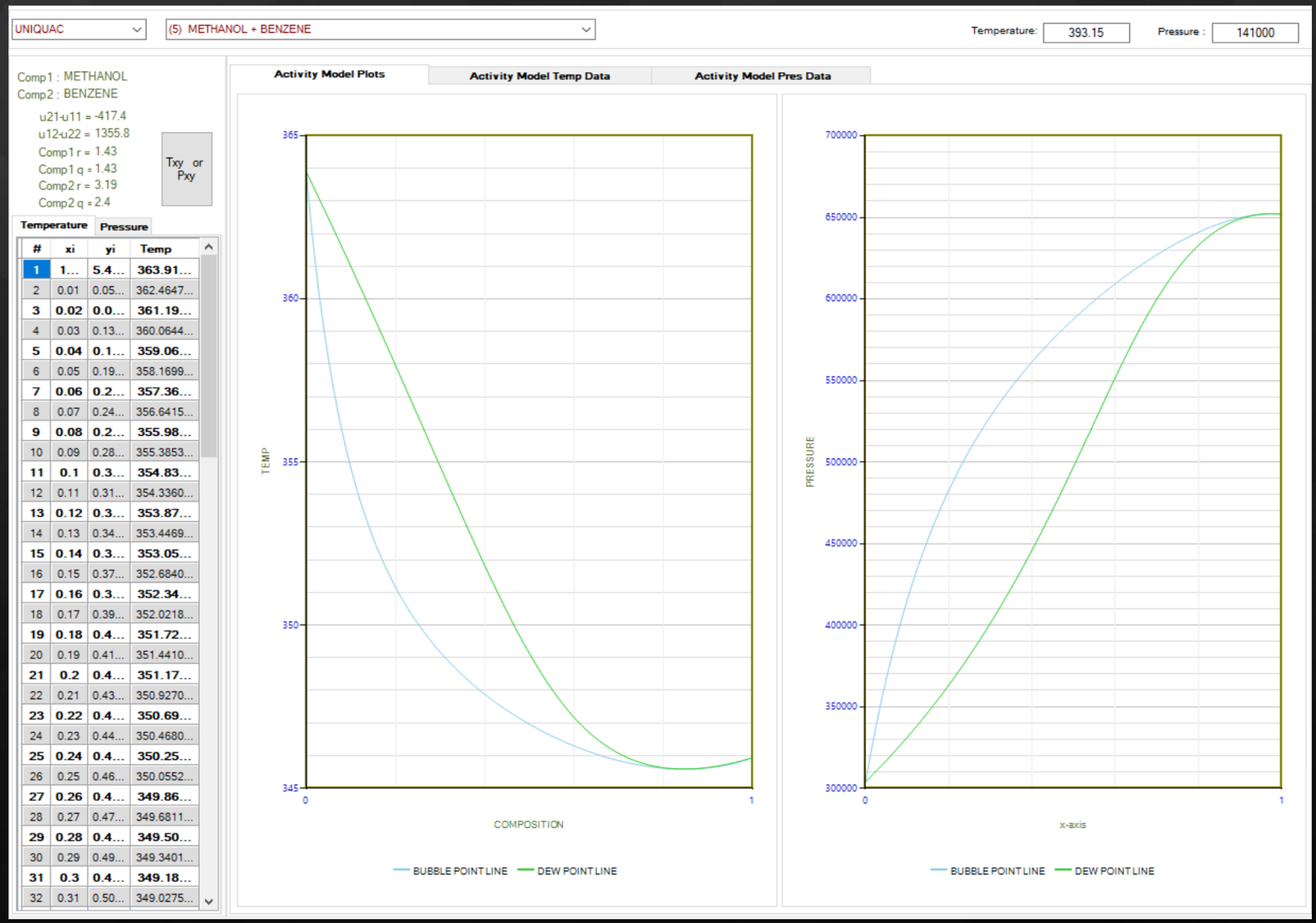


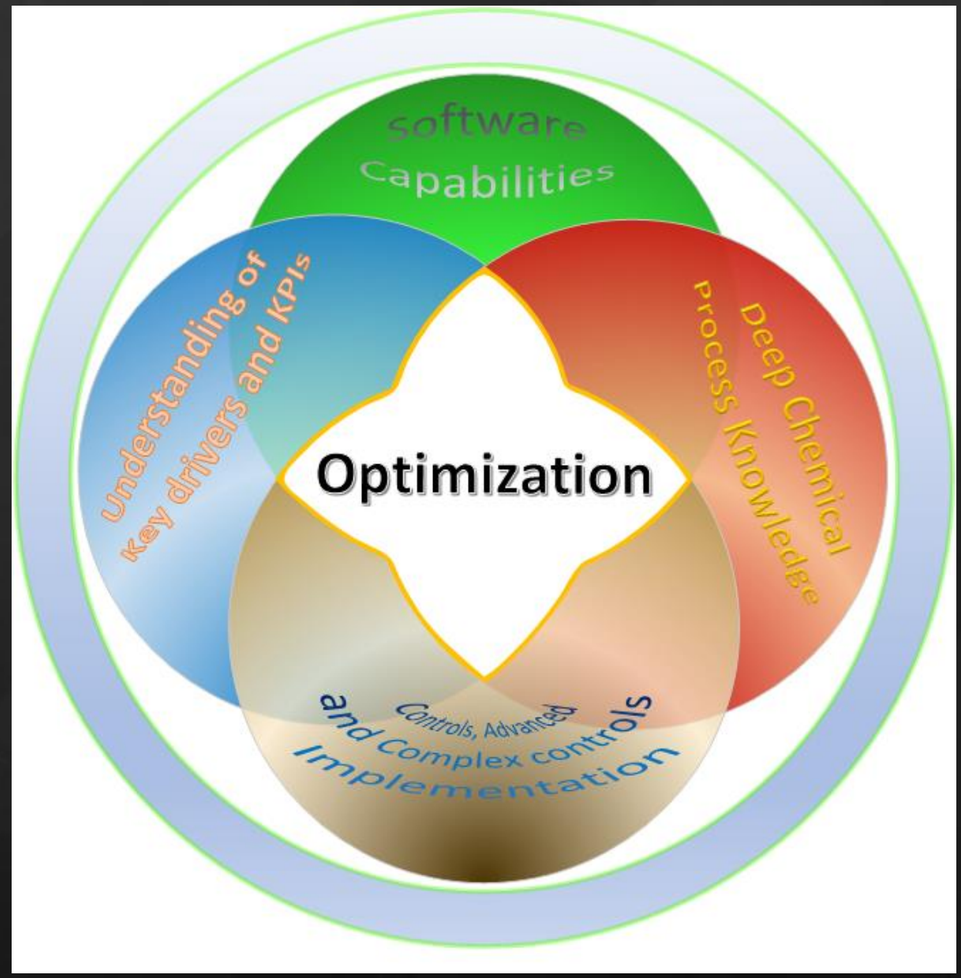
OPTIMIZATION:

The combination of our vast experience paired with our unique software solution provides the best choice for optimization.

We clearly show where the process is operating and what can or needs to be done to bring it back to optimal state.

Then we work with your team to implement process controls, design or operational changes using Artificial Intelligence from the combination of our software, other controls software packages and our experience.

Start saving today!!!

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OTHER SERVICES:

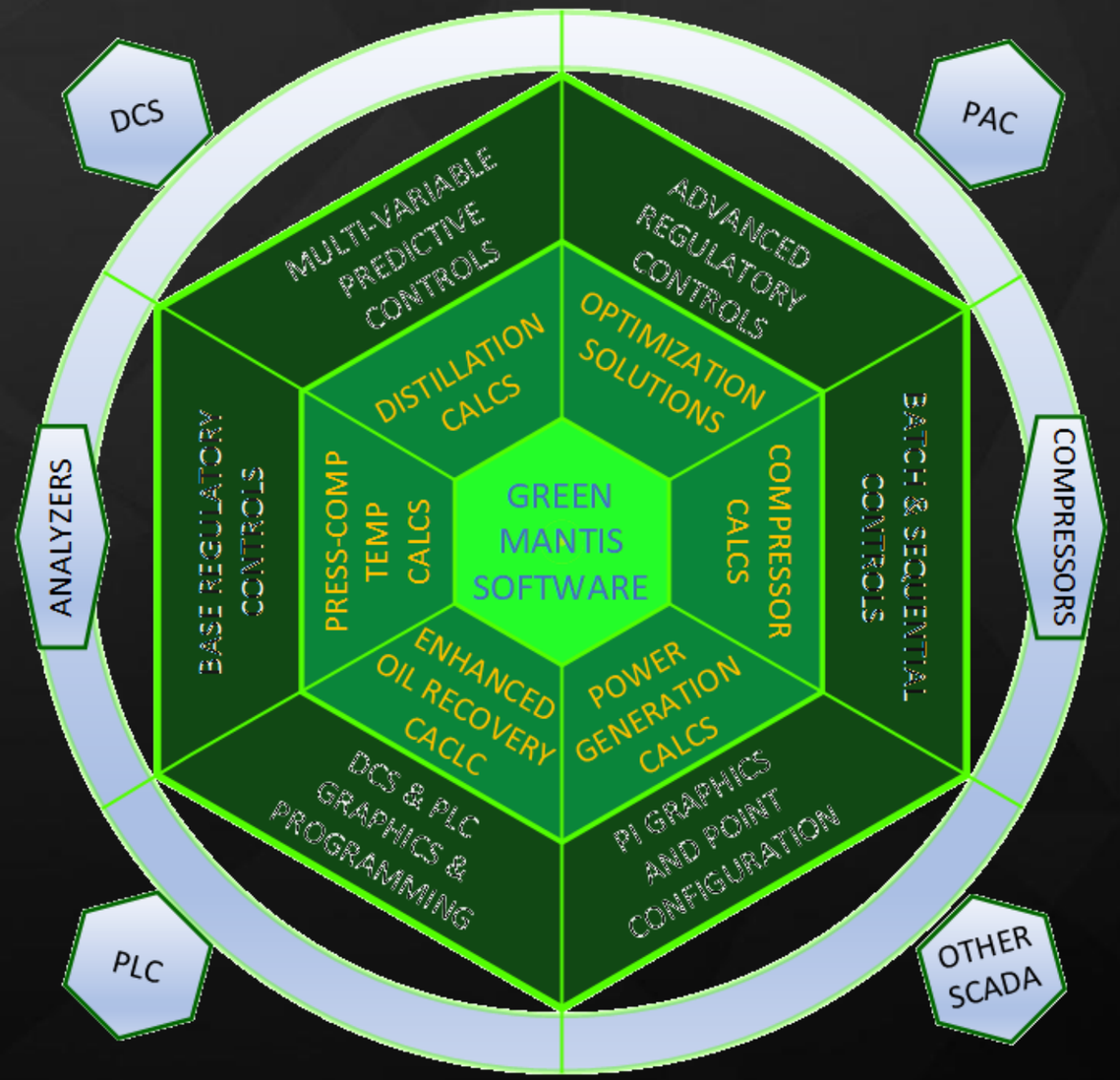
Configuration, programming, implementation

And evaluation of distributed control system for many control systems.

A common industrial distributed control system (DCS) such as Henwell Experion, ABB 800xa DeltaV, is configured and programmed to control and monitor the Production facilities. A cabinet which holds the hardware of the DCS system, including programmable logic controller (PLC), power supplies, input/output (I/O) cards, terminals, and relays are configured and wired to field devices of the system. A workstation and HMI screen are configured and setup. We provide services to setup the system and get it running. We also provide maintenance and system backup work including software installation and updates.

***Configuration, programming, implementation And evaluation of distributed control system for many control systems.***

***We also provide maintenance and system backup work including software installation and updates.***



# GREEN MANTIS, LLC


***GREEN MANTIS, LLC, a "Going Green" consulting firm specializing in marketing of high - technology products and services in America and International markets. Green Mantis markets consulting services, products and research in many markets of Industry wanting and needing to "Go Green".***

***We aid in saving the world's resources one City, one State, one Country at a time by aiding in the following markets: Maritime, Industrial, Manufacturing, Automatic Car Washes, Environmental, Urban development/redevelopment, Oil Refinery and Enhanced Oil Recovery.***

A Green Company

**Saving the World's Resources One City, One State, One Country at a time**

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